

# The 10 fundamental principles of lay resuscitation

## *Recommendations by the German Resuscitation Council*

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Sudden cardiac death due to out-of-hospital cardiac arrest is the third leading cause of mortality in industrialised nations.<sup>1–3</sup> In Europe and in the USA, 800 000 people die every year despite the fact that the emergency medical services initially resuscitate them. The main problem is that emergency medical services take an average of 8 min – and often much more – before they arrive at the scene. The brain tissue, however, commences to die after 3 to 5 min. Therefore, resuscitation procedures initiated by emergency medical services will start too late in the vast majority of cases, and this is the time interval in which lay resuscitation is mandatory.<sup>4–7</sup> Lay people witness an out-of-hospital cardiac arrest in more than 60% of incidents, and most of them occur at home.<sup>8–11</sup> When lay people start chest compressions and other resuscitation procedures, survival is tripled or quadrupled, and also the probability of good neurological outcome will increase.<sup>4–7</sup> Nevertheless in many countries, the lay resuscitation rate is below 30%, whereas in some countries, the rate is 50, 60 or 80%.<sup>8–11</sup> If all countries could achieve these high lay resuscitation rates, we would be able to save several hundred thousands of patients every year worldwide.

Using an interdisciplinary and interprofessional Delphi approach, the German Resuscitation Council recommends 10 fundamental principles of resuscitation for lay people. They focus on the most important and most effective issues of lay resuscitation and help in understanding and executing them. These 10 easy and precise principles will help the facilitation of achieving lay resuscitation rates of 50% or more all over the world. They should be distributed as widely as possible.

- (1) If lay people/bystanders start resuscitation procedures immediately in sudden out-of-hospital cardiac arrest before emergency medical services arrive, this is associated with a three-fold to four-fold increase in probability of a survival in good condition.<sup>4–7</sup>
- (2) The first measure is CHECK: if someone collapses, you must immediately check whether the person responds to loud speech or shaking of the shoulders and whether the person is breathing normally. If there is no reaction and the person is not breathing at all or is not breathing normally (gaspings is not normal breathing!), resuscitation procedures should be started immediately.<sup>12</sup>
- (3) The second measure is CALL: activate emergency medical services via emergency number [112 in all countries of the European Union and other European countries respectively, 911 in the USA (where 112 is forwarded to 911)]. At best, emergency medical services should be activated by another bystander, to start uninterrupted chest compressions immediately.<sup>12</sup>
- (4) The third measure is COMPRESS: most important are hard chest compressions. It works like this: the patient is lying on the back, the rescuer kneels down beside the patient's thorax, opens the shirt and puts the heels of his hands, one on the other, in the middle of the bare thorax between the nipples. Now the breastbone is pushed downwards by at least 5 cm and at maximum 6 cm in adults with straight arms and shoulders vertical above the compression point. Immediately after a compression, the pressure to the breastbone must be released

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DOI:10.1097/EJA.0000000000000865

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completely. Now continuously change between compression and release with a frequency of 100 to 120 hard compressions per minute, that is about two per second.<sup>12</sup> This is – for example – the beat of ‘Stayin’ alive’ from the Bee Gees. Compressions must not be interrupted at all until emergency medical services take over. If possible, the rescuer should be changed every 2 min.<sup>12</sup>

- (5) CHECK–CALL–COMPRESS: this is a ‘civic duty’; everyone should know how to do it, and should do it in case of cardiac arrest. During the first minutes of out-of-hospital cardiac arrest in most cases, adults still have enough oxygen in the blood, so that the interval between collapse and arrival of emergency medical services can be effectively bridged by chest compression only.<sup>4–7</sup> This facilitates oxygen containing blood to flow to the brain, and therefore, will keep the brain alive.
- (6) Additional VENTILATION by educated laypersons should be performed, if they are able and willing to do so.<sup>12</sup> Ventilation may further increase the chance of survival – in particular if it takes longer until emergency medical services arrive on the scene. Ventilation is of key importance if the cause of the cardiac arrest is oxygen deficiency, which is the case in almost all newborns, infants and children or in drowning.<sup>12</sup>
- (7) About 25% of patients with an out-of-hospital cardiac arrest may benefit from an automated external defibrillator in addition.<sup>8–11</sup> If an automated external defibrillator is available, it should be sent for. But chest compressions must never ever be interrupted to get an automated external defibrillator.<sup>12</sup> At least two lay rescuers must stay with the patient and provide uninterrupted chest compressions until emergency medical services arrive.
- (8) If a lay rescuer does not know how to perform chest compressions or if he or she is unsure, the dispatcher of the coordination centre of the emergency medical services should guide the lay rescuer to perform chest compression until emergency medical services arrive (telephone resuscitation).<sup>12</sup> Lay people should be able to activate the hands-free facility/loudspeaker on their phone, so that they can be guided by the dispatcher continuously. It is possible that the coordination centre activates via a smart phone-based system – simultaneously to emergency medical services – educated first responders who are nearby.<sup>12</sup> This can further increase the chance of survival.<sup>13</sup>
- (9) The recovery position has no role in cardiac arrest. If a person is unconscious and is not breathing or is not breathing normally, he or she is in cardiac arrest and only chest compressions are helpful.<sup>12</sup> If an

unconscious person is breathing normally, the recovery position may help to keep the airway open. In this case, normal breathing must always be rechecked carefully and continuously and, if there is any doubt, chest compressions and resuscitation procedures must start immediately.

- (10) CHECK–CALL–COMPRESS is a ‘civic duty’ which is essential for survival and must be undertaken urgently, always, and by everyone in suspected cardiac arrest. This must be taught everywhere, and this education must start in schools.<sup>3,14,15</sup> Artificial ventilation and an automated external defibrillator may also help to save lives and further increase survival rates in specific situations.

### Acknowledgements relating to this article

Assistance with the Editorial: none.

Financial support and sponsorship: none.

Conflicts of interest: none.

Comment from the Editor: this Editorial was checked by the editors but was not sent for external peer review. BWB is an Associate Editor of the *European Journal of Anaesthesiology*.

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