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Mechanical device enables single first-responders to be as effective as trained BLS-Teams







Single-Rescuer or small teams: first-responder from volunteer teams and the army



Traditionell method and new device: the bag-valve-system and "Animax" with spiro-set









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Background

The outcome of out-of-hospital cardiac arrests is directly dependent on the onset and the efficiency of basic life support [1]. As bystander-BLS is rare [2], first-responder-systems were implemented using trained volunteers. Their average on scene arrival time is 4 mins., typically more than 5 minutes before paramedic services [3]. In accordance with recently updated European Resuscitation Council guidelines [4], CPR is then commenced immediately until defibrillation becomes possible. As literature shows, chest compressions are only effective during the first minute after start, then a decrement in compression adequacy of 18.6% per minute is seen [5].

Aims

A device was sought that allows one rescuer to be as effective as a typical two-rescuer team in terms of ventilation with 100% oxygen and chest-compressions in a constant depth and frequency

Methods

We compared the use of "Animax" - a mechanical, hand-driven device for both ventilation and chest compression by one rescuer - with the classical two-rescuer-technique of bag-valve ventilation and manual chest compressions. We evaluated 20 trained volunteer first-responders in two-rescuer CPR with bagvalve ventilation and, after brief training, with "Animax" as a single rescuer to a manikin "AmbuMan".

Results:

Using "AmbuCPR 2.2" software the average depth of chest compressions was measured; in the manual CPR group the depth fell from 45mm (+/- 5mm) to 41mm (+/- 6mm) (p<0,005), while remaining constant in the "Animax"-group (38mm +/- 6mm and 37mm +/- 7mm) (p>0,05). The frequency of the chestcompressions was in both groups within the suggested ranges, also the compression/decompression ratio. The average time from start to the first effective application of CPR was 2.4s (+/-2.3s) in the manual and 50.6s (+/-19.5s) in the "Animax"-group.

Conclusion

The "Animax" enables a single rescuer to perform chest compressions in the frequency and depth that usually only a team of two trained persons is able to provide. Furthermore, this can be sustained over 5 min. of effective chestcompressions, while manual compressions become ineffective. In contrast to the good performance in CPR, we found a long set-up-time of the device that causes a long noflow time. But the large interval of the standard deviation suggests, that the set-up-time can be shortened by training. Methods for effective training have to be found and evaluated. Furthermore studies are necessary to assess if the chest-compressions provided by "Animax" are effective in humans.

References

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