“It takes a system to save a life”**- An analysis of selected EMS areas with emphasis to the implementation of the
Eisenberg's steps and the out-of-hospital cardiac arrest outcome**Barbara Jakisch¹, Jan Wnent^{1,2,3}, Sigrid Brenner⁴, Tanja Jantzen⁵, Andreas Bohn⁶, Matthias Fischer⁷, Jan-Thorsten Graesner¹, Stephan Seewald^{1,2}¹Institute for Emergency Medicine, University Hospital Schleswig-Holstein, Kiel, Germany. ²Department of Anaesthesiology and Intensive Care Medicine, University Hospital Schleswig-Holstein, Kiel, Germany. ³University of Namibia, School of Medicine, Windhoek, Namibia. ⁴University Hospital Dresden, Department of Anaesthesiology, Dresden, Germany. ⁵Interhospital-Transfer-Service Mecklenburg-Vorpommern, German Red Cross, Parchim, Germany. ⁶Medical Director of the EMS, City of Munster, Munster, Germany. ⁷Department of Anaesthesiology and Intensive Care, Klinik am Eichert, Goeppingen, Germany**Purpose of the study**

Patients who suffer a sudden out-of-hospital cardiac arrest (OHCA) have different survival rates through different regions and countries. In Europe, they vary between 6% and 24% (1). The presented study examines the data from nine EMS in Germany and shows the intensity of implementation of the Mickey Eisenberg's 10 Steps (2).

1. Establish a Cardiac Arrest Registry
2. Implement Dispatcher Assisted CPR with Ongoing Training & Quality Improvement (QI)
3. Implement High Performance CPR with Ongoing Training & QI
4. Implement Rapid Dispatch
5. Voice Record all Attempted Resuscitations
6. Begin a Program in Police Defibrillation
7. Establish a Public Access Defibrillation Program
8. Supplemental Funding & Support for Training & QI
9. Institute Hypothermia in All Receiving Hospitals
10. Work Toward A Culture of Excellence

Afterwards it was analyzed if there is a correlation between the fulfillment of the steps and a better patient survival.

Materials and methods

In this epidemiological cross-sectional study, data from the German Resuscitation Registry was evaluated. To answer the implementation of the 10 Steps from Mickey Eisenberg also a structured telephone interview with the medical EMS director was performed. Data results and interviews were weighted with points (up to 60) to be able to derive a Scorecard.. Cases with out-of-hospital cardiac arrests from EMS in Germany were included who entered complete and plausibility checked data sets in 2016.

Results

The 4,115 data sets that were entered were 2,309 resuscitation attempted. The average age was 68.3 years. ROSC was achieved in 46% of the patients and 41% were admitted to the hospital. 14% were discharged alive.

In this table, the results of the data being examined can be seen.

Here, graphs of the attempted resuscitations, all ROSC numbers, the sum of the points reached of the Eisenberg steps and the number of cases that could be discharged with good and moderate cerebral performance from hospital treatment can be seen.

	Attempted resuscitations	ROSC at hospital admission		Patient discharged alive		CPC 1/2		Σ of reached points
		in %	n=	in %	n=	in %	n=	
EMS 1	141	34%	48	11%	15	47%	7	33
EMS 2	349	36%	127	17%	58	79%	46	36
EMS 3	221	47%	104	23%	51	75%	38	32
EMS 4	86	37%	32	9%	8	88%	7	33
EMS 5	232	44%	101	13%	29	83%	24	35
EMS 6	698	40%	278	14%	98	4%	4	35
EMS 7	262	30%	79	12%	32	72%	23	34
EMS 8	223	42%	94	14%	30	90%	27	60
EMS 9	97	47%	46	11%	11	73%	8	32

Figure 1: Overview of the results

Conclusions

The fulfillment of the 10 Steps in the preclinical treatment of OHCA played a minor role in the survival rates. Important factors, such as time intervals and the hospital treatment are not considered here.

1. Gräsner J-T, Lefering R et al. EuReCa ONE-27 Nations, ONE Europe, ONE Registry: A prospective one month analysis of out-of-hospital cardiac arrest outcomes in 27 countries in Europe. Resuscitation 2016; 105:188–95. doi: 10.1016/j.resuscitation.2016.06.004

2. Eisenberg MSMD. Resuscitate! 2nd. Univ Of Washington Press; 2015.