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ADVANCED CARDIAC LIFE SUPPORT IN THE PREHOSPITAL SETTING

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Since 1982, a mobile emergency care unit (MECU) manned by a physician has been operated in the Reykjavik area (population 125.000). During the four years 1987-1990 there were 230 attempted resuscitations by the MECU team. Excluding arrests due to trauma, drowning, drug overdose, suicides and arrests in children there were 195 sudden cardiorespiratory arrests from cardiac causes. Men were 148 (76%) and women 47 (24%) and mean age was 66 years. Of these 195 patients, 64 were admitted to CCU or ICU and 31 (16%) was discharged from the hospital, all but two without mental impairment. Asystole was most frequently seen as the initial rhythm, or in 92 patients, ventricular fibrillation (VF) in 77, ventricular tachycardia (VT) in 4, electromechanical dissociation (EMD) and other rhythms in 22. The mean ambulatory response time was 4.6 min. In the 104 witnessed arrests bystanders initiated CPR in 44 patients (42%). 15 of the 44 (34%) were discharged from the hospital but only 10 of the 60 (17%) patients with witnessed arrests who awaited the arrival of the MECU for CPR.

Of the 77 patients with VF and 4 with VT, 25 (31%) were discharged. Only 6 of the 92 (7%) patients with asystole survived. The mean response time in these 6 was only 2.8 minutes and all were witnessed arrests. There were no survivors when the initial rhythm was rhythm other than VF, VT or asystole. Prognosis for patients with VF and VT was significantly better than for patients with other rhythms ($p<0.001$).

In comparison, a retrospective analysis of similar arrests in Reykjavik 1976-1979 showed that 9% of patients experiencing cardiac arrest survived and 20% of patients with VF were discharged.

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THE IMPACT OF INTRODUCING TECHNICIANS WITH ADVISORY DEFIBRILLATORS ON RESUSCITATION FROM OUT-OF-HOSPITAL CARDIAC ARRESTS BY PARAMEDICS

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Paramedics have operated in West Yorkshire since 1986 and their management of out-of-hospital cardiac arrests has been published. Since 1989, technicians with advisory defibrillators have been introduced. We have studied the effects of their introduction on survival from out-of-hospital cardiac arrests in the period April 1990 to June 1991. The paramedics were deployed as one member of a conventional, two-person, emergency ambulance crew.
236 cardiac arrests were attended by one of 43 paramedics. Ventricular fibrillation (VF) was the initial rhythm in 106 patients. 30 patients were admitted to hospital and 7 were discharged. 216 cardiac arrests were attended by one of 120 technicians with advisory defibrillators. VF was the initial rhythm in 125 patients. 17 patients were admitted to hospital and 10 were discharged. Paramedics resuscitated 9 patients with asystole or electromechanical dissociation as the initial rhythm. 8 patients were admitted and one was discharged. The technicians resuscitated 4 patients with asystole, who all died in hospital.
These paramedic results (6 survivors/year from 85 VF arrests/year) should be compared with the results in two earlier years (32 survivors/year from 228 VF arrests/year), when fewer paramedics were available. Ambulance technicians with advisory defibrillators have a useful role, but their introduction may reduce the effectiveness of the paramedic service. The reasons for this are unclear, but are probably related to changes in ambulance control.

paramedics: advisory defibrillators: out-of-hospital cardiac arrest

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EARLY DEFIBRILLATION BY EMT'S: THE BELGIAN EXPERIENCE

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The Belgian Cerebral Resuscitation Study Group has registered in 1983-87 data on out-of hospital cardiac arrest events that were first attended by EMT's (P. Calle et al.). On subsequent arrival of the MICU-team, ventricular fibrillation was present in 17%. Median time between collapse and initiation of BLS by EMT's was 8 min, and was 16 min between collapse and MICU-resuscitation. Therefore, it seemed worthwhile to train EMT's in the use of AED in MICU-served regions.
This observation and the findings of a pilot study in Brussel (coordinated by P. Mols) were an incentive to start a multicenter early defibrillation feasibility study, coordinated by the Belgian Early Defibrillation Working Group. Four large urban emergency centers, Antwerpen, Brugge, Brussel and Gent, participated in the prehospital study. Semi-automated defibrillators were used in 11 primary ambulance units, covering a population of ± 700,000 inhabitants. Defibrillation by non-physicians was made possible by a strict protocol according to AHA guidelines and by the use of written standing orders. A total of 237 EMT's were trained. Basic training level of EMT's was at least 60 hours, defibrillation protocol training varied from 10 to 20 hours. Second tier ACLS was provided by physician staffed ambulances. After 1 year, 351 patients with cardiac arrest were eligible for treatment with AED; 37% were in VF/VT. Overall long-term survival was 5.3 %. The possible reasons for this low survival figure will be discussed.

Cardiac arrest; AED; EMT-D

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EFFECT OF CAPNOGRAPHY ON RESUSCITATION EFFORTS DURING CPR

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Capnography is a valuable non invasive tool for assessing cardiac output during CPR. Real time quantification of CPR efficacy may alter rescuer's efforts (rate and/or force of external chest compressions). The aim of this prehospital prospective study was to analyze the effect of capnography availability on CPR efficacy.

Methods: After institutional approval, eleven adult patients in nontraumatic prehospital cardiac arrest were studied. Resuscitation was initiated by firefighters (BCLS) according to AHA guidelines. Then advanced CPR was provided by a prehospital medical team including one anesthesiologist. As soon as trachea was intubated, mechanical ventilation was applied at constant rate and flow, and end-tidal CO_2 pressure ($ETCO_2$) was continuously measured (Normocap, Datex, Finland). When stable $ETCO_2$ was obtained, the firefighter was informed that the displayed value was correlated with the efficacy of his chest compressions. Compressions rate and $ETCO_2$ before and 5 min after this information were compared. No bicarbonate infusion was administered during this period. Results are expressed as mean ± SD. Statistical comparison was performed using the Student's t test for paired samples.

Results: Three patients were successfully resuscitated. In all but one patients, information regarding capnography meaning resulted in an increase in $ETCO_2$. For the whole group of patients, the value raised from 11.1 mmHg ± 6.2 to 17.1 mmHg ± 8.7 ($p<0.001$). Greater increases were observed when $ETCO_2$ values were higher. The increase was 3.7 mmHg ± 2.3 in the group of patients with an $ETCO_2 \leq 10$ mmHg and 8.8 mmHg ± 2.7 for patients with an $ETCO_2 > 10$ ($p<0.01$). A simultaneous increase in compressions rate was observed from 75 min^{-1} ± 3 to 92 min^{-1} ± 7 ($p<0.01$).

Discussion: The observed increase in $ETCO_2$ appears to be related to the feed-back effect of capnography on resuscitation efforts. Neither bicarbonate infusion nor return of spontaneous pulse were present during the studied period. In addition, the increase in compression rate agrees with this hypothesis. It was probably associated with more vigourous compressions but this factor has not been evaluated. Further studies are needed to determine wether this stimulating effect of capnography results in a better outcome.

CPR - PREHOSPITAL CARDIAC ARREST - CAPNOGRAPHY