Purpose of the study
Mild hypothermia (32-34°C) is a promising new therapy for patients resuscitated from cardiac arrest. Animal studies suggest that early and fast cooling is crucial. Inducing mild hypothermia immediately after successful restoration of spontaneous circulation (ROSC) out-of-hospital remains a challenge. Therefore, a novel cooling-blanket (EMCOOLSpad®), independent of any energy source during use, was developed. The aim of the study was to evaluate feasibility and safety of out-of-hospital surface cooling with EMCOOLSpad® in patients successfully resuscitated from cardiac arrest.

Results
From 09/2006 to 01/2007, fifteen patients with a weight of 70 (63-84) kg were included into the study. Cooling was initiated 12 (8.5-15) min after ROSC. The cooling-blanket decreased Tes from 36.6 (36.2-36.6) °C at start of cooling to 34.0°C within 54 (39-80) min, and to target temperature Tes 33°C within 70 (55-106) min, resulting in a cooling rate of 3.3 (2.0-4.0) °C/h (Figure 1). The temperature curve over 24 hours after ROSC is shown in Figure 2. Hospital admission was 45 (34-52) min after ROSC, Tes 33°C was achieved 50 (29-82) min after admission. In 9 patients, pre-cooled parts of the cooling-blanket had to be reapplied repeatedly on chest and abdomen to maintain the target temperature of Tes 33°C for 24 hours. One patient died before hospital admission, nine died during hospital stay, four patients survived to hospital discharge, and one undergoes rehabilitation. No skin lesions were observed.

Materials and Methods
Included in the study were patients successfully resuscitated from out-of-hospital cardiac arrest with esophageal temperature (Tes) > 34°C. The EMCOOLSpad® consists of multiple cooling units (12 mm thick), filled with a mixture of graphite/water, which are stored in a cooling box at -3°C in the ambulance car. Cooling was initiated as soon as feasible by the first treating paramedics and emergency physicians, and continued in the Emergency Room (ER) until Tes 34°C, when the cooling-blanket was removed. Target-temperature of Tes 33°C was kept for 24 hours. Data are presented as median and interquartile range (25-75%).

CONCLUSIONS
Non-invasive surface cooling with EMCOOLSpad® immediately after resuscitation from cardiac arrest, in the out-of-hospital setting, showed to be feasible and safe. If early cooling, as compared to delayed cooling in the hospital, will improve neurological outcome, needs to be determined in a prospective randomized trial.