

Aspects of post-resuscitation care after out-of hospital cardiac arrest

Akademisk avhandling

som för avläggande av medicine doktorexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligen försvaras i Hjärtats aula, Sahlgrenska Universitetssjukhuset, Vita stråket 12, den 3 maj, klockan 09:00.

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Avhandlingen baseras på följande delarbeten

- I. Martinell L, Larsson M, Bång A, Karlsson T, Lindqvist J, Thorén AB, Herlitz J. *Survival in out-of-hospital cardiac arrest before and after use of advanced post resuscitation care: a survey focusing on incidence, patient characteristics, survival, and estimated cerebral function after post resuscitation care.* Am J Emerg Med. 2010;28(5):543-51.
- II. Martinell L, Herlitz J, Lindqvist J, Gottfridsson C. *Factors influencing the decision to ICD implantation in survivors of OHCA and its influence on long-term survival.* Resuscitation. 2013;84 (2):213-7.
- III. Martinell L, Nielsen N, Herlitz J, Karlsson T, Horn J, Wise MP, Undén J, Rylander C. *Early Predictors of Poor Outcome after Out-of-Hospital Cardiac Arrest.* Accepted for publication in Critical Care.
- IV. Martinell L, Herlitz J, Karlsson T, Nielsen N, Rylander C. *Mild induced hypothermia and survival after out-of-hospital cardiac arrest in a Swedish urban area.* Submitted manuscript.

SAHLGRENKA AKADEMIN



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Abstract

Cardiac disease is the most common cause of death in the western world and the majority of these deaths are due to out-of-hospital cardiac arrest (OHCA).

The aims of Papers I, II and IV were to evaluate different aspects of post-resuscitation care and their importance for survival after OHCA. The aim of Paper III was to use information available at hospital admission to develop a risk score for poor outcome.

In Paper I, we did not find any significant change in one-year survival between the two time periods (1980-2002 and 2003-2006) when all the patients were studied (27% vs. 32%; $P = 0.14$). Among patients found in ventricular fibrillation, an increase in one-year survival was found (37% vs. 57%; $P=0.0001$). The proportion of survivors to hospital discharge with a low cerebral function (cerebral performance category score 3) decreased from 28% to 6% ($P = 0.0006$) among all patients.

The use of implantable cardioverter defibrillators (ICDs) increased (Paper II), but only 15% received an ICD. Among patients who received an ICD, the two-year mortality was 2%, versus 25% among those who did not ($p < 0.0001$). The long-term follow-up showed that the use of an ICD had a borderline association with a lower risk of death (adjusted hazard ratio 0.49; 95% confidence interval (CI), 0.24-1.01; $p = 0.052$).

In Paper III, we identified ten independent predictors of a poor outcome among patients admitted to hospital after OHCA and created a risk score based on the impact of each of these variables. This score yielded a median area under the curve corrected for optimism of 0.842 (range; 0.840-0.845) and good calibration. The most important predictors were initial rhythm, age and length of no-flow and low-flow.

In Paper IV, we studied the association of mild induced hypothermia (MIH) and survival in patients admitted unconscious to hospital using stratified propensity score analysis. Odds ratio (OR) for 30-day survival was not significantly higher in patients treated with mild induced hypothermia (MIH) compared with non-MIH-treated patients; OR 1.33 (95% CI 0.83-2.15; $p=0.24$). A good neurological outcome at hospital discharge was seen in 82% of patients who were discharged alive from hospital.

Keywords: Out-of-hospital cardiac arrest, survival, Implantable Cardioverter Defibrillator, prediction of prognosis, mild induced hypothermia