

# Cardiac arrest outside and inside hospital from a 30-year perspective in the Municipality of Gothenburg

## Akademisk avhandling

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av

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This thesis is based on the following studies:

- I. **Fredriksson, M., J. Herlitz, and J. Engdahl**, *Nineteen years' experience of out-of-hospital cardiac arrest in Gothenburg--reported in Utstein style*. Resuscitation, 2003. **58**(1): p. 37-47
- II. **Fredriksson, M., Aune, S., Thorén, A-B., Herlitz, J.**, *In-hospital cardiac arrest--an Utstein style report of seven years experience from the Sahlgrenska University Hospital*. Resuscitation, 2006. **68**(3): p. 351-8
- III. **Herlitz, J., et al.**, *Very high survival among patients defibrillated at an early stage after in-hospital ventricular fibrillation on wards with and without monitoring facilities*. Resuscitation, 2005. **66**(2): p. 159-66
- IV. **Fredriksson, M., et al.**, *Cardiac arrest outside and inside hospital in a community: mechanisms behind the differences in outcome and outcome in relation to time of arrest*. Am Heart J, 2010. **159**(5): p. 749-56
- V. **Fredriksson, M.H., J. Lindqvist, J. Axelsson, C.**, *Outcome after out-of-hospital cardiac arrest in a community in an 18-year perspective*. Submitted for publication, 2011

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# Cardiac arrest outside and inside hospital from a 30-year perspective in the Municipality of Gothenburg

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## ABSTRACT

**Aims:** 1: To describe the epidemiology of both out-of-hospital cardiac arrest (OHCA) and in-hospital cardiac arrest (IHCA) in the Municipality of Gothenburg. 2: To describe the differences and similarities in cardiac arrest inside and outside hospital. 3: To describe the eventual change in outcome following the implementation of mechanical chest compression in the emergency medical service. **Method:** Consecutive OHCA cases in the Municipality of Gothenburg between 1980 and 2009 to which the emergency medical service responded were followed up to hospital discharge and at 1-month after the event for survival and neurological outcome according to the Utstein guidelines. Consecutive IHCA cases at Sahlgrenska university hospital between 1994 and 2006 to which the rescue team was called were followed up to discharge and at one month after the event for survival and neurological outcome according to the Utstein guidelines. We used the Swedish Cardiac Arrest Register for comparison. **Results:** In the time period 1980 - 1999 there were 3871 OHCA of cardiac aetiology. The delay to defibrillation was short and 27 % of the witnessed OHCAs and 12 % of the unwitnessed OHCAs received bystander-CPR. In all, 8.8% survived to discharge. Of the bystander-witnessed cardiac arrest of cardiac aetiology found in ventricular fibrillation were 20 % discharged from hospital. In the time period 1994 – 2002, the rescue team at Sahlgrenska University hospital was called 1570 times. In 71% of the cases, the patient had suffered a cardiac arrest. If the patients found in ventricular fibrillation were defibrillated within three minutes, survival to discharge was 63% if the IHCA occurred on a ward with ECG-monitoring capacity and 72% if the IHCA occurred on a ward without ECG-monitoring capacity. Of IHCAs between 1994 and 2001 did 37 per cent survive to hospital discharge, and 86 percent of them were alive one year later. The survival after IHCA was three times higher compared with OHCA for shockable rhythms and seven times higher for non-shockable rhythms. During the last decade, there was an increase in survival which was associated in terms of time with an increase in the use of mechanical chest compression. However, other factors of importance for survival also changed. **Conclusion:** If patients with ventricular fibrillation are defibrillated within three minutes after collapse, the majority will survive. There are changes in survival after OHCA in Gothenburg over time with improvement and deterioration. The mechanisms behind these changes are not entirely understood, but a delay to start of treatment and post-resuscitation care are most probably important. Survival after IHCA is much higher than after OHCA, but this is not solely explained by a short time to the delivery of treatment.

**Keywords:** Cardiac arrest, heart arrest, mechanical chest compression, prognosis, out-of-hospital cardiac arrest, in-hospital cardiac arrest, Utstein, outcome, DNAR

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