

# **A Bayesian competing risks survival model to study the cause of death in patients with heart failure**

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Heart Failure (HF) is a chronic, progressive condition which happens when the heart is not able to pump enough blood to supply the patient's tissues. Cardiac Resynchronization Therapy (CRT) is a procedure to implant electrodes in the heart's chambers to make the heart work in a more organized and efficient way. This therapy improves the prognosis and reduces hospitalization rates and mortality in HF patients. Although the effects of this therapy have been assessed on a short-term basis, there are scarce published data on the long-term benefits of the CRT.

The aim of this work is to study the long-term cardiovascular and non-cardiovascular death in HF patients who underwent CRT and its relationship with demographic and clinical variables. This follow-up study includes 296 patients who received CRT in a tertiary cardiac institution between August 2001 and April 2015. Patients with unknown cause of death were withdrawn.

For the statistical analysis we used a Bayesian competing risks model for the events cardiovascular death and non-cardiovascular death. Bayesian estimation was performed using MCMC methods with JAGS software. Posterior outputs such as the posterior distribution for the cause-specific baseline hazard function for cardiovascular and non-cardiovascular death, posterior distribution for the cumulative incidence function for each cause of death as well as the posterior distribution of the overall survival function are discussed.

**Keywords:** Cardiac Resynchronization Therapy; Cardiovascular and non-cardiovascular death; Cumulative incidence function; Overall survival function.