Educational level and risk of all-cause death in patients with heart failure with reduced ejection fraction (HFrEF): a report from the WARCEF Trial

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Background: The influence of social determinants of health (SDOH) on the prognosis of patients with Heart Failure and Reduced Ejection Fraction (HFrEF) is increasingly reported; however, the contribution of educational level to this risk of adverse outcomes in HFrEF is unclear.

Purpose: We aimed to explore the role of the educational level on the risk of adverse outcomes.

Methods: We used data from the WARCEF trial, which randomised HFrEF patients with sinus rhythm to receive Warfarin or Aspirin; educational level of patients enrolled was collected at baseline. We defined three levels of education: low, medium and high level, according to the highest qualification achieved or highest school grade attended, consistently to previous classification. The primary outcome for this analysis was the risk of all-cause death; we also analyzed other exploratory secondary outcomes. Outcomes were analysed using adjusted Cox-regression analysis; competing-risk analysis using Fine-Gray regression were additionally performed.

Results: 2,295 patients (mean age 60.8 ± 11.3; 20% females) were included in this analysis. After a median follow-up time of 3.7 [IQR: 2.0-5.0] years, 546 (23.8%) death were recorded. Highest percentage of females were in the low educational level (21.6%), while in medium education females were 19.3%, and in high educational level were 17.4%. Highest percentage of non-married people were in the low and medium educational level patients (35.7% and 41.0%, respectively), while in high education level patients, non-married were 26.4%.

Patients with low educational level had a high risk of all-cause death (adjusted Hazard Ratio [aHR] 1.44, 95% Confidence intervals (CI) 1.10-1.89) compared to those at high educational level; no statistically significant differences were observed for those with medium educational level (aHR: 1.27, 95%CI: 0.97-1.68). Survival curves for the risk of all-cause death is shown in Figure 1. Similar results were observed for the composite outcome of death, ischemic stroke or intracerebral hemorrhage. No statistically significant differences were observed for the subdistribution hazards of secondary outcomes in the competing-risk analysis.

Conclusions: Low educational status is associated with worse prognosis in HFrEF patients. These findings underline the importance of considering SDOH in the management of these subjects.
Kaplan Meier Curves

All-Cause Death

- High Education
- Low Education
- Medium Education

Survival probability

Time (Months)

Number at risk

- Low Education: 992, 958, 918, 824, 732, 590, 546, 456, 413, 317, 282

p = 0.0065