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**EVOLIUCINĖ MEDICINA:
ŽMOGAUS RAIDOS PERSPEKTYVOS IR SVEIKATA
BESIKEIČIANČIOJE APLINKOJE**

**EVOLUTIONARY MEDICINE:
PERSPECTIVES ON HUMAN DEVELOPMENT AND HEALTH
CONSEQUENCES IN A CHANGING ENVIRONMENT**

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MULTIMORBIDITY CLUSTERS AMONG HEART FAILURE PATIENTS: SURVIVAL DIFFERENCES

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Background and Aim: Patients with heart failure (HF) often present with multiple coexisting chronic conditions, yet the prognostic relevance of specific disease patterns remains uncertain. This study aimed to identify multimorbidity clusters among patients with HF and assess differences in survival outcomes.

Materials and Methods: This retrospective analysis used data obtained from the Lithuanian National Health Insurance Fund database and included 152,244 patients with a diagnosis of HF during 2016–2020. Disease clusters were identified using the CLARA algorithm with Jaccard distance, grouping patients with similar patterns of chronic diseases. The elbow method was used to determine the optimal number of clusters. All-cause mortality was calculated for each cluster, while cluster-specific survival was estimated using Kaplan–Meier analysis and compared with the log-rank test.

Results: Eight multimorbidity clusters were identified, ranging in size from 2,504 to 30,058 patients, with all-cause mortality rates from 11.5% to 56.2%. Cluster 1 had the highest mortality (N = 18,001; mean age 80.5 years; mortality 56.2%) and was characterised by hypertension, ischemic heart disease, dementia, and stroke. Clusters 6 and 7 also showed high mortality despite lower mean ages than Cluster 1: Cluster 6 (N = 14,148; mean age 73.6 years; mortality 36.1%) was defined mainly by diabetes, ischemic heart disease, and hypertension, whereas Cluster 7 (N = 11,374; mean age 77.2 years; mortality 48.0%) was marked by ischemic heart disease and chronic obstructive pulmonary disease. The lowest mortality was observed in Cluster 8 (N = 2,504; mean age 65.8 years; mortality 11.5%). Kaplan–Meier analysis demonstrated significant differences in cluster-specific survival, confirmed by the log-rank test ($p < 0.001$).

Conclusions: Distinct multimorbidity clusters in patients with HF were associated with significant differences in survival outcomes. These findings suggest that disease-based clustering may help identify patients who require closer follow-up.

Keywords: clustering, heart failure, multimorbidity, survival