SURVIVAL DIFFERENCES IN HEART FAILURE PATIENTS WITH AND WITHOUT IRON DEFICIENCY OR ANEMIA AND BY IRON TREATMENT

Altevers J1, Jacob C1, Maas C1, Krinke K-S1, Barck P, Hardt T2, Braun S1

OBJECTIVES

- Iron deficiency/anemia (IDA) are frequent comorbidities in heart failure (HF) and associated with increased morbidity.
- Treatment of IDA includes oral and intravenous iron, but little is known about the effect of different treatments on mortality.
- The aim of this study was to determine survival differences between HF patients with untreated IDA and with untreated IDA and differences between various iron treatments in a real-world setting, stratified by New York Heart Association (NYHA) classes.

METHODS

- A retrospective, matched cohort analysis was conducted from the statutory health insurance (SHI) perspective.
- Therefore, data from the InGef research database (Institut für angewandte Gesundheitsforschung Berlin) containing German claims data of over 4 million covered lives were used.
- HF patients within this database were identified using the International Statistical Classification of Diseases and Related Health Problems, 10th revision, German Modification (ICD-10-GM) Code I09 - in the inpatient setting (main or secondary diagnoses) or outpatient setting (verified diagnoses) in 2013.
- These patients were stratified by IDA using the ICD-10-GM Codes D50, D50.0, D50.8, D50.9, or E61.1 or using the Anatomical Therapeutic Chemical Code B03A for prescribed iron medication.
- Patients with the need of dialysis in the baseline period were excluded before matching, as dialysis-dependent IDA was not the subject of this study.
- HF patients without IDA and HF patients with untreated incident IDA were matched 1:1. Incident IDA was determined applying a 1 year diagnosis-free period before the IDA diagnosis in 2013.
- HF patients with untreated IDA, HF patients with IDA starting oral iron treatment, and HF patients with IDA starting intravenous iron treatment were matched 1:1:1.
- An exact, matching approach on age/age group, gender, and NYHA class was applied. Additionally, baseline healthcare costs were matched using an optimization algorithm that minimized the cost difference over all matched pairs.
- All-cause mortality was analyzed in a 1 year time frame and tested with the McNemar test.
- Survival was analyzed in a 1 year time frame using Kaplan-Meier curves and logrank tests.
- The data analysis was performed in cooperation between Xcenda GmbH and Elsevier Health Analytics.

RESULTS

Study Cohorts

- In total, n=3,048 HF patients with untreated incident IDA were matched to HF patients without IDA (1:1:1 matching).
- The matching of HF patients with IDA without iron treatment, with oral iron treatment, or with intravenous iron treatment resulted in n=352 triplets (1:1:1 matching).

Baseline Characteristics – 1:1 Matching

- HF patients without IDA and HF patients with untreated incident IDA were on average 79.9 years old (±10.1 years) and 58.1% were female.
- The majority of patients in both cohorts (44.6%) were classified as NYHA n/a due to unspecified ICD-10-GM Codes, while 2.9% belonged to NYHA 1, 12.2% to NYHA 2, 25.1% to NYHA 3, and another 20.1% to NYHA 4.
- The annual baseline healthcare costs averaged €24,574.56 (±32,832.12) in HF patients without IDA and €25,858.74 (±39,819.91) in HF patients with untreated incident IDA.
- The standardized differences ranging from 0 to 3.5 showed that the matching parameters were balanced between the cohorts after matching.

Baseline Characteristics – 1:1:1 Matching

- HF patients with untreated IDA were on average 79.3 years old (±8.7 years), HF patients with IDA starting oral iron treatment 79.4 years old (±8.6 years), and HF patients with IDA starting intravenous iron treatment 79.3 years old (±8.5 years), due to matching on age groups.
- Among all three matched cohorts, 58.2% were female.
- The majority of patients in all three cohorts (81.1%) was classified as NYHA n/a. 14.0% as NYHA 1, 13.8% as NYHA 2, 16.8% as NYHA 3, and 8.5% as NYHA 4.
- The mean annual baseline healthcare costs reached €205,811.20 (±34,734.89) in HF patients with untreated incident IDA, €19,124.46 (±26,364.41) in HF patients with IDA starting oral iron treatment, and €19,252.00 (±26,693.26) in HF patients with IDA starting intravenous iron treatment.
- The standardized differences ranging from 0 to 4.9 showed that the matching parameters were balanced within the three cohorts after matching.

Survival – 1:1 Matching

- In a 1-year time frame, 33.1% of the HF patients with untreated incident IDA died, as opposed to 24.1% of HF patients without IDA (P<0.01).
- The all-cause mortality increased with HF severity indicated by NYHA classes but was always higher among HF patients with untreated incident IDA than among HF patients without IDA (Figure 1).
- The time-to-death analysis revealed that HF patients with untreated IDA had a significantly lower 1-year survival probability than patients without IDA (P<0.01) as displayed in Figure 2.
- This was observed for all NYHA classes except for NYHA class 1 where the same trend did not reach statistical significance (P=0.74).

Figure 1. All-cause mortality rates in the 1:1 matched cohorts

Figure 2. Kaplan-Meier curves comparing the 1:1 matched cohorts

CONCLUSIONS

- This matched cohort study using real-world data from the SHI in Germany revealed that HF patients with comorbid IDA had a lower 1-year survival probability than HF patients without IDA, irrespective of NYHA class.
- Similar implications are found in the literature which highlights the need to prevent or treat IDA among HF patients. 1,2,4
- Additionally, the study showed that iron treatment is associated with an improved survival probability.
- This trend was particularly evident in HF patients with IDA starting intravenous iron treatment. They had a significantly higher 1-year survival probability than untreated HF patients in all NYHA classes.
- Intravenous iron treatment was also associated with survival advantages when compared to oral iron treatment, especially among NYHA class 2 patients.

LIMITATIONS

- In general, claims data analyses are subject to limitations as they are primarily collected for accounting purposes, and therefore clinical parameters are not covered.

REFERENCES