Heart failure epidemiology and outcomes in Poland from 2010 to 2021: A marked decline in HF hospitalization rate during the COVID-19 pandemic

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INTRODUCTION

The COVID-19 pandemic affected healthcare performance. This nationwide study evaluated trends in heart failure (HF) epidemiology and patient outcomes during the first 2 years of the COVID-19 pandemic in Poland.

METHODS

This retrospective study included all adult HF patients treated from January 1, 2010, to December 31, 2021, in the public healthcare sector in Poland. Data were based on the Nationwide Polish Ministry of Health Registry. This cross-sectional investigation included all patients with inpatient or outpatient diagnosis of HF. Co-morbid conditions were identified based on ICD-10 diagnoses and incorporated into the Charlson Comorbidity Index (CCI). Data on unplanned hospital admissions were collected. The investigation conformed to the principles outlined in the Declaration of Helsinki. The Regional Ethical Review Board approved the study.

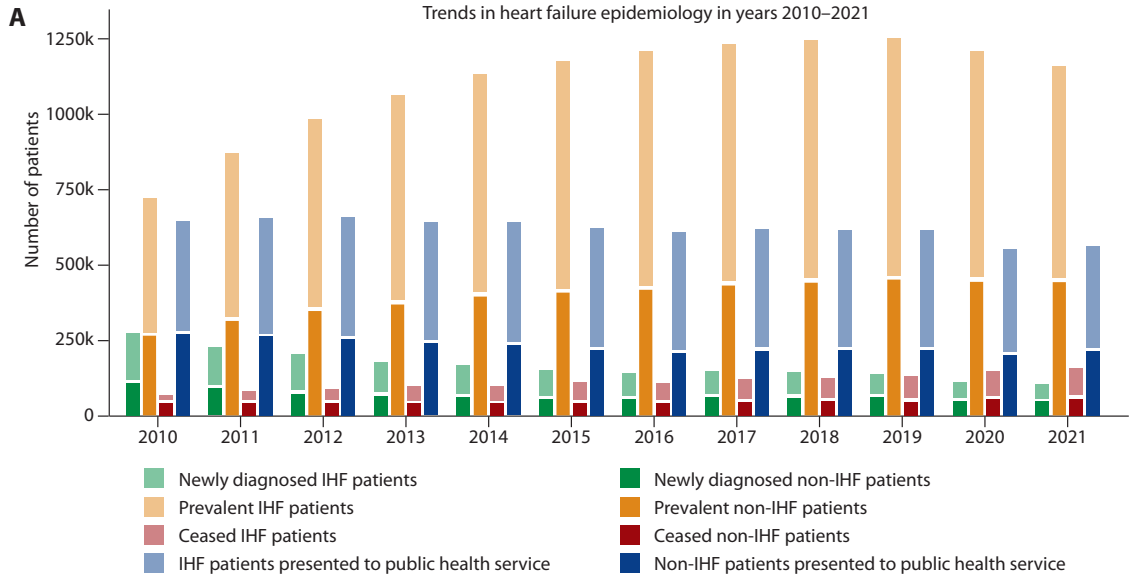
Data were presented as mean values or percentages. The study did not use a random sample. All patients using the public healthcare sector in Poland participated in the study. Therefore, statistical significance cannot be verified. All analyses and plots were performed using free-license R.

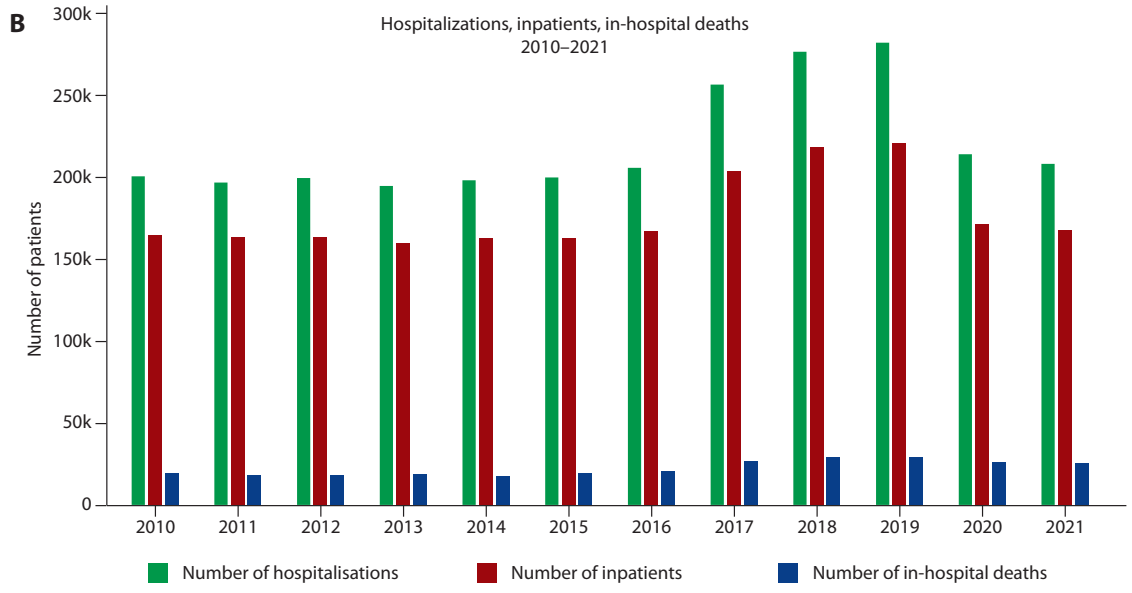
RESULTS AND DISCUSSION

Heart failure epidemiology

Heart failure incidence declined from 0.39% in 2019 to 0.2% in 2020 and 0.3% in 2021 (Supplementary material, *Table S1*). This reflects an absolute decline in new HF cases of 18% and 22% in 2020 and 2021, respectively (Figure 1A; Supplementary material, *Table S2*). Given the average yearly drop of 7% in the last decade, this was the greatest decline (Figure 1A; Supplementary material, *Table S2*). The change was mainly driven by a decline in the number of patients with ischemic HF (Figure 1A; Supplementary material, *Table S2*). As a result, 2020 was the first year over a decade when ischemic etiology accounted for the minority of incident HF (Figure 1A; Supplementary material, *Table S2*). The CCI score of incident patients has slightly increased from 1.23 to 1.25 (Supplementary material, *Table S1*).

The prevalence decreased from 3.63% in 2019 to 3.59% in 2020 and 3.48% in 2021 (Supplementary material, *Table S1*). It was the first decline in the last decade (Figure 1A; Supplementary material, *Table S2*). This reflected a drop of 7.6% in the total number of HF patients by the end of 2021 (Figure 1A; Supplementary material, *Table S2*). Ischemic HF prevalence decreased from 2.26% to 2.11%





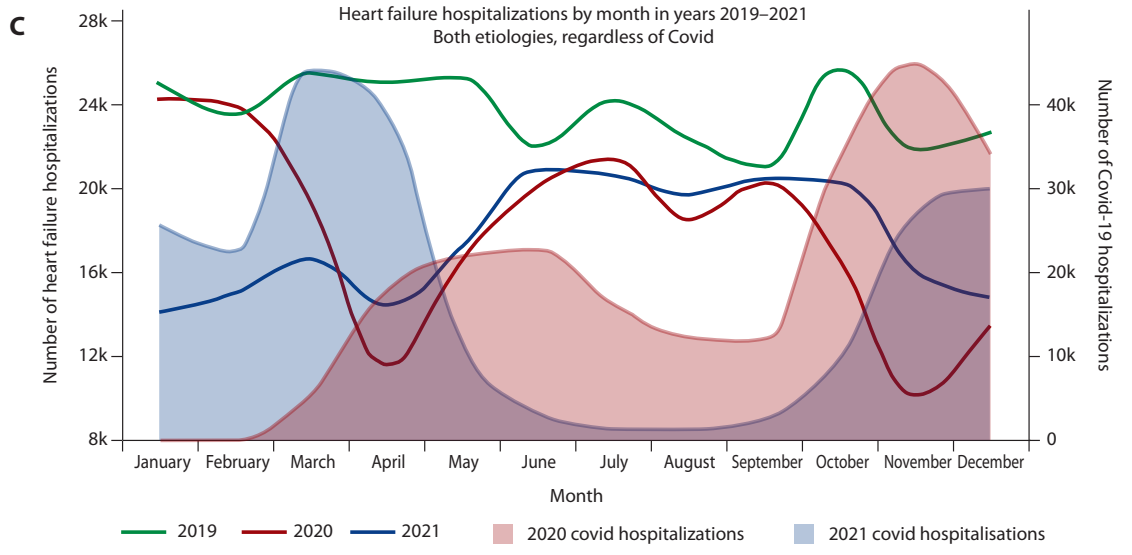


Figure 1. A. Trends in heart failure epidemiology in the years 2010–2021. **B.** Hospital admissions and inpatient deaths in the years 2010–2021. **C.** Heart failure hospital admissions by month in the years 2019–2021

Abbreviations: IHF, ischemic heart failure

in 2021, and non-ischemic HF remained steady (Supplementary material, *Table S2*).

Mortality increased from 9.92% in 2019 to 11.54% in 2020 and 12.47% in 2021 (Supplementary material, *Table S1*). In comparison to 2019, an excess of 20 088 (14.5%) and 27 087 (19.5%) HF patient deaths was recorded in 2020 and 2021, respectively. It was the first time over the last decade that the number of deaths exceeded the number of newly diagnosed HF cases (Figure 1A; Supplementary material, *Table S2*). Total mortality among ischemic HF patients increased from 9.13% to 12.18% in 2021 and from 11.26% to 12.93% among non-ischemic HF patients (Supplementary material, *Table S2*). Regardless of etiology, mortality increased remarkably among patients with CCI >5 points (Supplementary material, *Table S1*).

Patient presentation and outcomes

The number of HF patients who presented at least once to the public healthcare system in Poland dropped by 10.97% in 2020 and 9.16% in 2021 compared to 2019 (Figure 1A; Supplementary material, *Table S2*). The number of patients with ischemic HF dropped by 12.2% in 2020 and 13.3% in 2021, and by 8.8% and 2% for non-ischemic HF (Figure 1A). This decline was mainly driven by the reduction in hospital admissions (Figure 1B). There were 24% and 26% fewer hospital admissions in 2020 and 2021 (Figure 1B; Supplementary material, *Table S3*). Admissions to cardiac units declined by 19% and 9%, respectively (Supplementary material, *Table S4*), while admissions to non-cardiac departments plummeted by 23% and 31%. (Supplementary material, *Table S4*). The number of outpatient visits dropped only by 11% in 2020 and 5% in 2021, with significant recovery in cardiac secondary care (Supplementary material, *Table S4*). Every month, the number of admissions reflected pandemic fluctuation (Figure 1C; Supplementary material, *Table S3)*.

The number of patients hospitalized at least once dropped from 17.63% (222 426) to just above 14% (172 960 and 169 153) in 2020 and 2021 (Figure 1B; Supplementary material, *Table S5*). Patients hospitalized during the pandemic years were slightly younger and more often resided in nonurban areas compared to 2019 (Supplementary material, *Table S5*). There was a greater drop in the number of ischemic HF patients being hospitalized in 2019 (27% vs. 18% for non-ischemic). The comorbidity burden (CCI) of hospitalized patients increased from 1.33 to 1.37 in 2021 (Supplementary material, *Table S5*). The mean length of hospital stay was comparable.

In-hospital mortality rose and reached 16% in 2020 and 15.72% in 2021 compared to 14.07% in 2019 (Supplementary material, *Table S5*). Monthly, the percentage of hospital stays that ended with death varied in parallel with COVID-19 waves (Supplementary material, *Figure S1* and *Table S3*). Additionally, the rate of hospital admissions ending with death within the day from admission increased to 1.11% in 2020 compared to 0.93% in 2019 and improved to 0.97% in 2021 (Supplementary material, *Table S3*). In-hospital mortality of ischemic HF patients increased from 11.69% in 2019 to 13.8% in 2021, while non-ischemic patients experienced only a transient rise in 2020 (Supplementary material, *Table S5*).

This nationwide study displays challenges met by the Polish healthcare system over the years 2010–2021. By the end of 2019, there was a gradual uptrend in HF prevalence accompanied by a downtrend in incidence and leveled-off mortality. During the first 2 years of COVID-19, significant shifts in epidemiology occurred. HF incidence and prevalence decreased for the first time in the decade. This was accompanied by a remarkable reduction in HF hospital admissions and an incremental increase in total and in-hospital mortality, with ischemic HF patients being mostly affected.

Yearly reduction in the total number of hospital admissions exceeded 20%. The drop in non-cardiac unit admissions was markedly greater compared to cardiac units. Worldwide declines in HF hospital admissions followed by decreased incidence were reported [1]. The outpatient visits were less affected, which could be the result of high use of tele-visits in Poland [2].

Total and in-hospital mortality in Poland was on the rise in the first 2 years of the COVID-19 pandemic. Limited access to healthcare services and patients' reluctance to seek help could have contributed. During the COVID-19 pandemic, as many as 28% of Polish residents admitted having unmet needs for medical examination or treatment [3]. Access to the most effective treatment became available late into the pandemic [4]. Kubica et al. [5] reported a significant reduction in self-referrals and an increased number of acute HF patients brought by ambulance. Finally, quick protective measures such as lockdowns could limit virus spread in Poland but, on the other hand, could prevent people from seeking help.

The ischemic HF subpopulation experienced a profound decline in incidence and prevalence along with a mortality increase compared to barely changed epidemiology of non-ischemic HF.

Limited data refer to differences in outcomes between HF etiology during the COVID-19 pandemic. A significant drop in percutaneous coronary interventions could contribute to unfavorable outcomes in ischemic HF patients. According to Drożdż et al. [6], in Lodz Voivodship, by the end of 2020, the number of percutaneous coronary interventions dropped below 85% in 2019. Secondly, it can be assumed that ischemic patients were reluctant to seek help or could not receive it early, as Hawranek et al. [7] reported a decrease in the number of cases of myocardial infarction along with the rise in cases of cardiac arrest before admission. Finally, patients with acute coronary syndromes presented in pandemics, similar to HF patients analyzed in this study, had a greater comorbidity burden [8].

This study has the limitations inherent to a registry of unaudited procedures, and the results may not necessarily be generalizable outside the study period. However, they

may indicate changes in HF epidemiology in the coming years. The study is awaiting continuation with an overview of the HF population by the end of 2024 to assess if the pandemic had long-term effects.

To sum up, during the two years of the COVID-19 pandemic, significant shifts in epidemiology were noted. Interestingly, ischemic HF patients experienced worse outcomes compared to non-ischemic. The pandemic reshaped the HF population, and at the beginning of 2022, it was reduced by 7.7% and became younger with fewer comorbidities. In light of the above facts and the ongoing COVID-19 pandemic beyond 2022, an increase in HF incidence in the years following pandemics might be anticipated in Poland as a tidal effect to delay or deferral of care for patients with HF or other cardiac symptoms.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

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