

**Emergency hospital admissions and interventional treatments
for heart failure and cardiac arrhythmias in Germany
during the Covid-19 outbreak
Insights from the German-wide Helios hospital network**

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A reduction of hospital admissions for acute coronary syndromes in association with reduced cardiac catheterizations has been observed in Europe¹⁻³ and the U.S.⁴ during the Covid-19 pandemic. There is growing concern that this may be accompanied by a substantial increase in early and late infarct-related morbidity and mortality. Heart failure and cardiac arrhythmias are also frequent causes for emergency hospital admissions, but the impact of the Covid-19 pandemic on admission rates and interventional treatments is unknown.

Consequently, we performed a retrospective analysis of claims data of 66 Helios hospitals in Germany.⁵ Consecutive patients with an emergency hospital admission between March 1, 2020 and April 30, 2020 (study period), March 1, 2019 and April 30, 2019 (previous year control) and January 1 and February 28, 2020 (same year control) were studied. Data were stored in a pseudonymized form, and data use was approved by the Helios hospitals data protection authority. Cause-specific hospitalizations were defined on the basis of primary diagnosis according to International Statistical Classification of Diseases and Related Health Problems [ICD-10-GM (German Modification)] codes for heart failure (I42.x; I43.x; I50.x), bradycardias (including cardiac conduction disease; I44.x, I45.0 – I45.5, I45.9, I49.5, R00.1), atrial fibrillation/flutter (I48.x), supraventricular (I45.6, I47.1, R00.0) and ventricular tachycardias (I47.0, I47.2, I49.0, I49.3). Interventional treatments were defined according to the German procedure classification („Operationen und Prozedurenschlüssel“, OPS) for catheter ablations (8-835) and implantation of cardiac rhythm management devices (CRM devices; pacemakers, defibrillators and event recorders; 5-377, 5-378). Incidence rates for cause-specific admissions and interventions were calculated by dividing the number of cumulative cases by the number of days for each time period. Incidence-rate ratios comparing the study period to each of the control periods were calculated using Poisson generalized linear mixed models to model the number cause-specific emergency hospitalizations and interventional treatments per day.

A total of 17,417 emergency hospital admissions (10,215 for heart failure, 7,202 for cardiac arrhythmias) and 1,832 interventions (749 ablations, 1,083 implants) were included. Emergency admissions declined during Covid-19 outbreak by 22 – 28 % for heart failure and 13 – 27 % for cardiac arrhythmias. This was accompanied by a 15 – 27 % reduction in interventional treatments (Table 1).

To the best of our knowledge, this report is the first that analyzes emergency hospitalisations and interventional treatments for heart failure and cardiac arrhythmias in the largest German hospital network during the Covid-19 pandemic. In agreement with previous studies focusing on acute coronary syndromes and cardiac catheterization,¹⁻⁴ a significant decrease in emergency hospitalization and interventional treatments has been observed. The contribution of this finding to acute, i.e. in-hospital or excess mortality not fully explained by Covid-19 cases alone, and long-term morbidity and mortality deserves further studies.

Conflict of Interest: none declared

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Legends

Table 1. Comparison of emergency hospital admissions for heart failure and cardiac arrhythmias as well as interventional treatments in the German-wide Helios hospital network between the Covid-19 outbreak and two control periods.

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Cardiovascular disease or procedure	Study period	Same year control	Previous year control
Heart failure			
No. of cumulative admissions	2,820	3,791	3,604
No. of daily admissions (IR)	46.2	64.3	59.1
Incidence rate ratio (95% CI)		0.72 (0.69–0.76)	0.78 (0.74–0.82)
P value		< 0.01	< 0.01
Bradycardia			
No. of cumulative admissions	290	379	334
No. of daily admissions (IR)	4.8	6.4	5.5
Incidence rate ratio (95% CI)		0.74 (0.64–0.86)	0.87 (0.74–1.01)
P value		< 0.01	0.07
Atrial fibrillation/flutter			
No. of cumulative admissions	1,322	1,739	1,640
No. of daily admissions (IR)	21.7	29.5	26.9
Incidence rate ratio (95% CI)		0.74 (0.68–0.79)	0.81 (0.75–0.87)
P value		< 0.01	< 0.01
Supraventricular tachycardia			
No. of cumulative admissions	242	312	283
No. of daily admissions (IR)	4.0	5.3	4.6
Incidence rate ratio (95% CI)		0.75 (0.64–0.89)	0.86 (0.72–1.01)
P value		< 0.01	0.07

Cardiovascular disease or procedure	Study period	Same year control	Previous year control
Ventricular tachyarrhythmia			
No. of cumulative admissions	182	228	251
No. of daily admissions (IR)	3.0	3.9	4.1
Incidence rate ratio (95% CI)		0.77 (0.64–0.93)	0.73 (0.60–0.87)
P value		< 0.01	< 0.01
Catheter ablation			
No. of cumulative admissions	208	277	264
No. of daily admissions (IR)	3.4	4.7	4.3
Incidence rate ratio (95% CI)		0.73 (0.61–0.87)	0.79 (0.66–0.94)
P value		< 0.01	0.01
CRM device implantation			
No. of cumulative admissions	310	408	365
No. of daily admissions (IR)	5.1	6.9	6.0
Incidence rate ratio (95% CI)		0.73 (0.64–0.85)	0.85 (0.73–0.99)
P value		< 0.01	0.03

IR, incidence rate; CI, confidence interval; CRM; cardiac rhythm management