Cumulative hospitalization deficit for cardiovascular disorders in Germany during the Covid-19 pandemic

Insights from the German-wide Helios hospital network

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During the early phase of the Covid-19 pandemic, reductions of hospital admissions have been shown for several cardiovascular disorders including acute coronary syndromes, heart failure and cardiac arrhythmias in Europe [1-3] and the U.S.[4] However, there is only scarce data on hospitalization trends during the course of the pandemic that is, moreover, limited to acute coronary syndromes.[2-4] Consequently, the aim of this correspondence is to illustrate hospitalizations for several acute and chronic cardiovascular conditions and thereby to introduce the cumulative hospitalization deficit as novel metric to monitor hospitalizations as the pandemic continues.

Thus, we performed a retrospective analysis of claims data of 82 Helios hospitals in Germany.[5] Consecutive cases with a hospital admission between March 13, 2020 (the begin of the protection stage according to the German pandemic plan) and July 16, 2020 (study period) were studied and compared to a corresponding period covering the same weeks in 2019 (March 15 – July 18, 2019). Cause-specific hospitalizations were defined on the basis of primary discharge 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), cardiac arrhythmias (I44.x; I45.x; I47.x – I49.x, R00.0 – R00.2), ischemic heart disease (I20.x – I25.x), valvular heart disease (I05.x – I08.x; I34.x – I37.x; Q22.x – Q23.x; T82.0; Z95.2 – Z95.4), arterial hypertension (I10.x – I15.x), and peripheral vascular disease (I70.x – I79.x).

Cumulative hospitalization deficit was computed as the difference between the expected and observed cumulative admission number for every week in the study period, expressed as a percentage (95% confidence interval [CI]) of the cumulative expected number. The expected admission number was defined as the weekly average during the control period. The

difference between the expected and observed cumulative admission number was assessed using a χ^2 test for the admission nadir defined as the week with the lowest admission number and the last week of the study period. The p values were adjusted for multiple comparisons using a Bonferroni correction.

A total of 139,041 hospital admissions (62,606 during the study and 76,435 during the control period) were included. There was a decline in hospitalizations during the early phase of the study period leading to an increase in the cumulative hospitalization deficit across all analyzed diseases until the nadir (Figure 1). The nadir was reached in the week April 10–16, 2020 for all conditions except for heart failure (March 20–26, 2020) and hypertension (March 27–April 2, 2020). During the nadir, weekly hospitalizations were reduced by 28–43% (Table 1). Thereafter, the cumulative hospitalization deficit decreased to - 17–20% at the end of the study period (Figure 1, Table 1).

To the best of our knowledge, this report that analyzes hospitalizations for several cardiovascular conditions has several strengths, i.e. it uses the largest German hospital network during 4 months of the Covid-19 pandemic, the longest observation period so far.
In agreement with previous studies,[1-4] a significant decrease of hospitalizations reaching 43 % has been observed. Our analysis confirms and extends findings from very recent studies focussing on acute coronary syndromes. These studies have reported a recovery phase with cases reaching almost previous year control period values. However, as can be appreciated from our analysis, there remains a substantial deficit in cumulative hospital admissions.
The long-term consequences of those observations deserve further studies. In that respect, delayed diagnosis of acute or deterioration of chronic cardiovascular disorders followed by increased admissions, and higher morbidity and mortality is a potential future scenario for

which we must prepare. Conversely, if there is no concomitant mid- and long-term increase in morbidity and mortality, this may suggest an overly aggressive existing model of care.

Conflict of Interest: none declared

References

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Legends

Table 1. Cumulative hospitalization deficit for several cardiovascular conditions in the German-wide Helios hospital network at the nadir and in mid July 2020 during the Covid-19 pandemic.

Figure 1. Cumulative hospitalization deficit for several cardiovascular conditions in the German-wide Helios hospital network during the Covid-19 pandemic.

Table 1

Table 1.

	Nadir week	Admissions until the nadir week				Admission until the final week (10 July-16 July)			
		Expected (n)	Observed (n)	Hospitalization deficit (95% CI)	P Value	Expected (n)	Observed (n)	Hospitalization deficit (95% CI)	P Value
Heart failure	20 March-26 March	1,657	1,044	-37% (-41; -33)	< 0.001	14,917	11,902	-20% (-21; -19)	< 0.001
Cardiac arrhythmias	10 April-16 April	4,982	3,087	-38% (-40; -36)	< 0.001	17,935	14,975	-17% (-18; -15)	< 0.001
Ischemic heart disease	10 April-16 April	5,302	3,567	-33% (-35; -31)	< 0.001	19,086	15,928	-17% (-18; -15)	< 0.001
Valvular heart disease	10 April-16 April	1,324	809	-39% (-43; -35)	< 0.001	4,765	3,863	-19% (-21; -17)	< 0.001
Arterial hypertension	27 March-2 April	1,782	1,284	-28% (-32; -24)	< 0.001	10,690	8,589	-20% (-21; -18)	< 0.001
Peripheral vascular disease	10 April-16 April	2,512	1,429	-43% (-46; -40)	< 0.001	9,042	7,349	-19% (-20; -17)	< 0.001

Figure 1