

Piotr Lackowski¹, Maciej Piasecki¹, Michał Kasprzak¹, Jacek Kryś², Piotr Niezgoda¹, Jacek Kubica¹

¹Department of Cardiology and Internal Medicine, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland

²Dr A. Jurasz University Hospital no. 1, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland

COVID-19 pandemic year in the cardiology department

Corresponding author:

Piotr Lackowski, Department of Cardiology and Internal Medicine, Collegium Medicum, Nicolaus Copernicus University, Marii Skłodowskiej-Curie 9 St., 85-094 Bydgoszcz, Poland, e-mail: lackowski.piotr@gmail.com

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ABSTRACT

Introduction: A COVID-19 pandemic has resulted in noticeable changes in the functioning of the Department of Cardiology, dr A. Jurasz University Hospital no. 1 in Bydgoszcz. This study aims to compare the functioning of the university cardiology department in the pandemic year 2020 to the previous years.

Materials and methods: The retrospective analysis of patients hospitalized in the Department of Cardiology, dr A. Jurasz University Hospital no 1 in Bydgoszcz, Poland, has been performed. Collected data included the number of patients admitted to the hospital, medical diagnoses, performed procedures and in-hospital mortality.

Results: Throughout 2020 numbers of both new hospitalizations and diagnostic or therapeutic procedures in electrophysiology, echocardiography and invasive cardiology showed a major decrease. The greatest impact was observed in March, April, and the last 3 months of the year. The pandemic also affected in-hospital mortality.

Conclusions: The observed decrease in the number of hospital admissions of specialized cardiac procedures performed in 2020 may have a serious impact on future patients' profile.

Key words: COVID-19, SARS-CoV-2, pandemics, cardiology, hospitals

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Introduction

A Coronavirus Disease 2019 (COVID-19) pandemic that has lasted since the beginning of the year 2020 caused a change in many areas of life for people from all over the world. The increasing number of patients infected with the severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) affected also the Polish healthcare system triggering major changes in patients' habits. Despite the initially limited number of infected patients, the snowballing number of new positive SARS CoV-2 cases caused also in the department of cardiology the necessity to cope with a new medical issue and forced opening the insulation section for the COVID-19 patients. This study aims to compare the functioning of the university cardiology department in the pandemic year 2020 to the previous years.

Materials and methods

The data was obtained from the electronic database used in the Department of Cardiology, dr A. Jurasz

University Hospital no 1 in Bydgoszcz. Retrospective analysis of patients' medical history collected by attending physicians enabled them to obtain information regarding the number of patients admitted to the hospital, medical diagnoses, performed procedures and in-hospital mortality. The data on procedures performed in 2020 were compared to the period of 2018–2019, whereas comparison of data on medical diagnoses, number of patients and mortality included 2020 versus 2016–2019 period. The data regarding new hospitalizations included both new admissions to the hospital and transfers from other departments. The ratio of the number of deaths to the sum of all patients discharged from the department was used to determine the in-hospital mortality. The number of implanted or replaced cardioverter-defibrillators included data on single and dual-chamber defibrillators, subcutaneous devices and cardiac resynchronization therapy defibrillators. The number of implanted and replaced pacemakers included data on single and dual-chamber devices, as well as cardiac resynchronization pacemakers. Publicly available internet data on the number of new cases was used to refer observed frequency of analysed events

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to the incidence of COVID-19 in Poland and the in the Kuyavian-Pomeranian Voivodeship, where dr A. Jurasz University Hospital no. 1 is located. The statistical analysis was carried out using the Statistica 13.0 package (TIBCO Software Inc, California, USA). Data regarding each year were presented as monthly or weekly averages (means) with standard deviations. The Shapiro-Wilk test demonstrated the non-normal distribution of the investigated variables. Therefore, a non-parametric test was used for statistical analysis. Comparisons between the year 2020 and previous years were performed with the Mann-Whitney unpaired rank-sum test. Results were considered significant at $p < 0.05$.

Results

First reports of patients infected with SARS-CoV-2 spread in December 2019. The first patient in Poland was identified on 4th March 2020 – in the hospital in Zielona Gora. Called by the World Health Organization (WHO) COVID-19 pandemic affected also the functioning of the Department of Cardiology, dr A. Jurasz University Hospital No. 1 in Bydgoszcz. The incidence of COVID-19 in the Kuyavian-Pomeranian Voivodeship, where dr A. Jurasz University Hospital no. 1 is located, were higher than in Poland as a whole country in the last four months of 2020 (Fig. 1).

The pandemic itself imposed major changes in the functioning of the Department of Cardiology, dr A.

Jurasz University Hospital No. 1 in Bydgoszcz. In the first half of March, clinical classes for students were cancelled. The temporary change of work organization of the medical staff to working in teams lasted until the beginning of May. The increase in the number of infected patients in the last three months of the year 2020 affected functioning again. On November 9th, the isolation section for patients infected with COVID-19 was opened in the study clinic - initially for 6 patients and then extended to 15 afterwards. Taken actions resulted in a reduction of new hospitalizations (3396 patients in 2020 compared to 3906 in 2019) (Fig. 2) The number of primary diagnoses among discharged patients also changed (Fig. 3).

The collected data showed an increase in mortality in 2020 in comparison to the previous period (Fig. 4). The increase was seen in the months of the first and second waves of the COVID 19 pandemic. The data collected from the study department is consistent with the data recorded in the Polish Registry of Civil Status. (Fig. 5).

The change was also seen in the number of procedures performed in the field of electrophysiology, echocardiography and invasive cardiology (Tab. 1). The differences were observed in the following procedures: transthoracic echocardiographies, implanted and replaced Cardioverter-defibrillators (ICDs), left atrial appendage occlusions and intravascular ultrasound measurements (only procedure with an increase in the number of procedures).

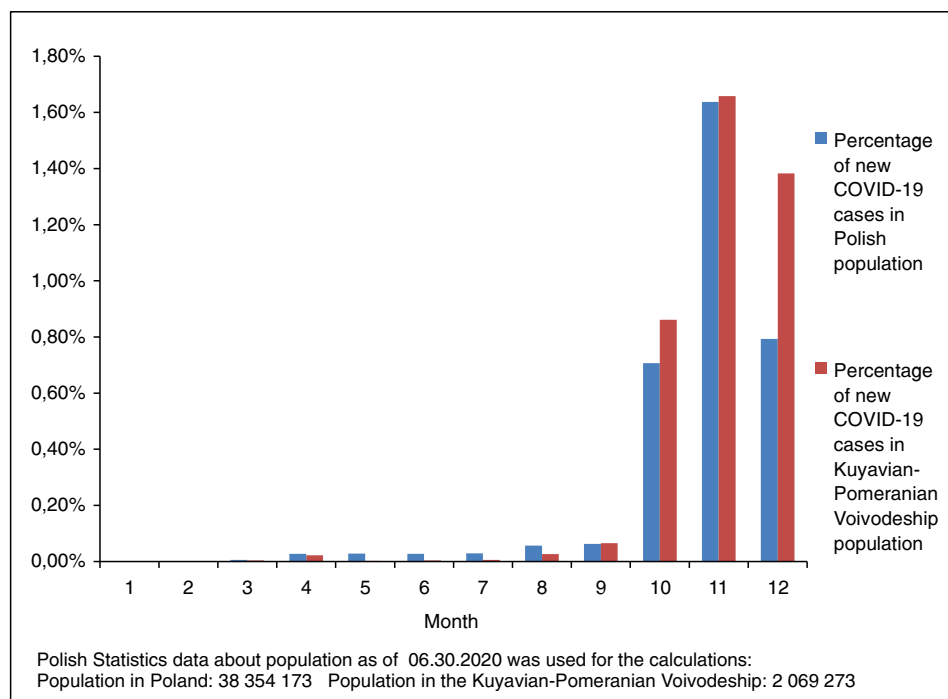


Figure 1. Incidence of COVID-19 in 2020

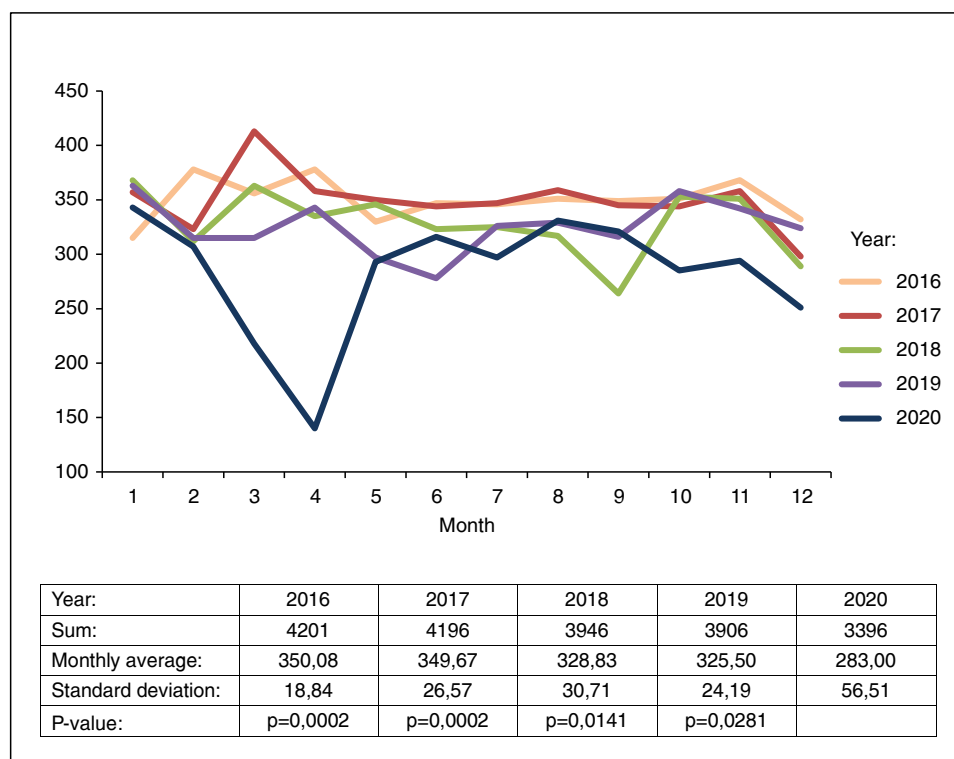


Figure 2. Number of new hospitalizations in the department of cardiology, dr A. Jurasz University Hospital No. 1 in Bydgoszcz

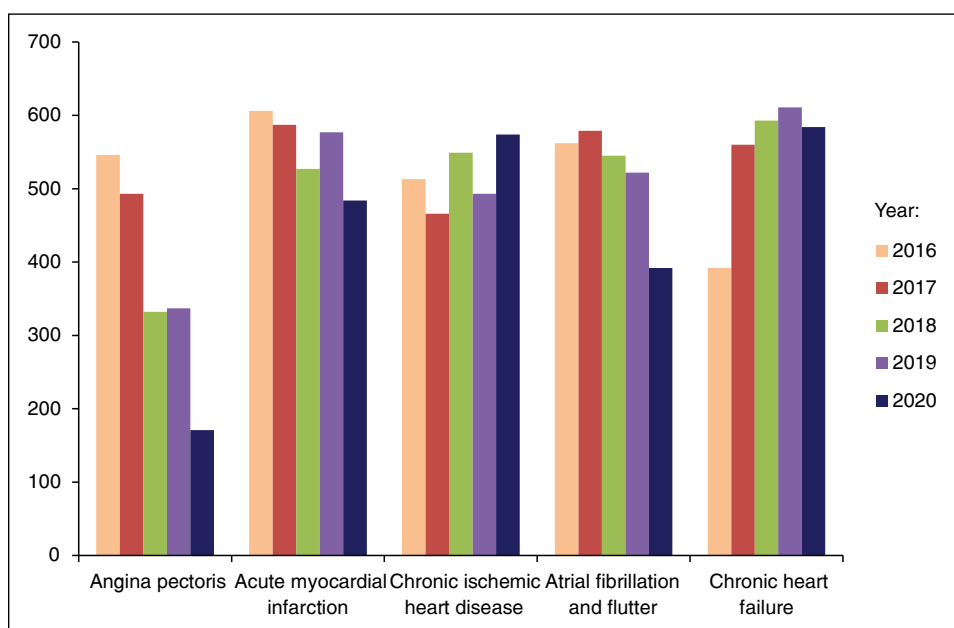


Figure 3. Number of primary diagnoses among patients discharged from the department of cardiology, dr A. Jurasz University Hospital No. 1 in Bydgoszcz

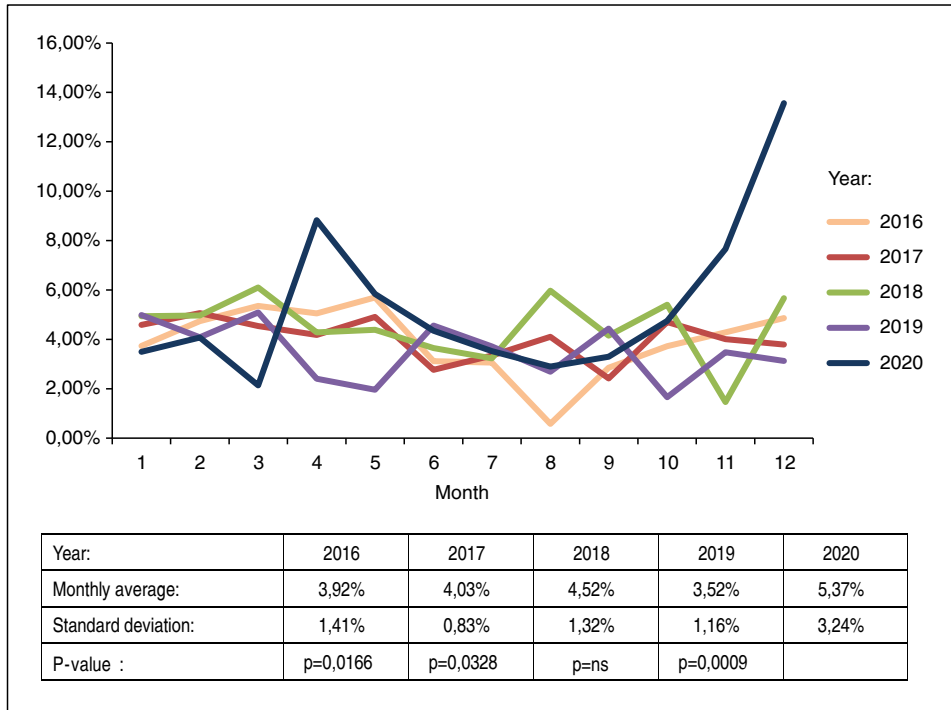


Figure 4. The mortality rate in the department of cardiology, dr A. Jurasz University Hospital No. 1 in Bydgoszcz

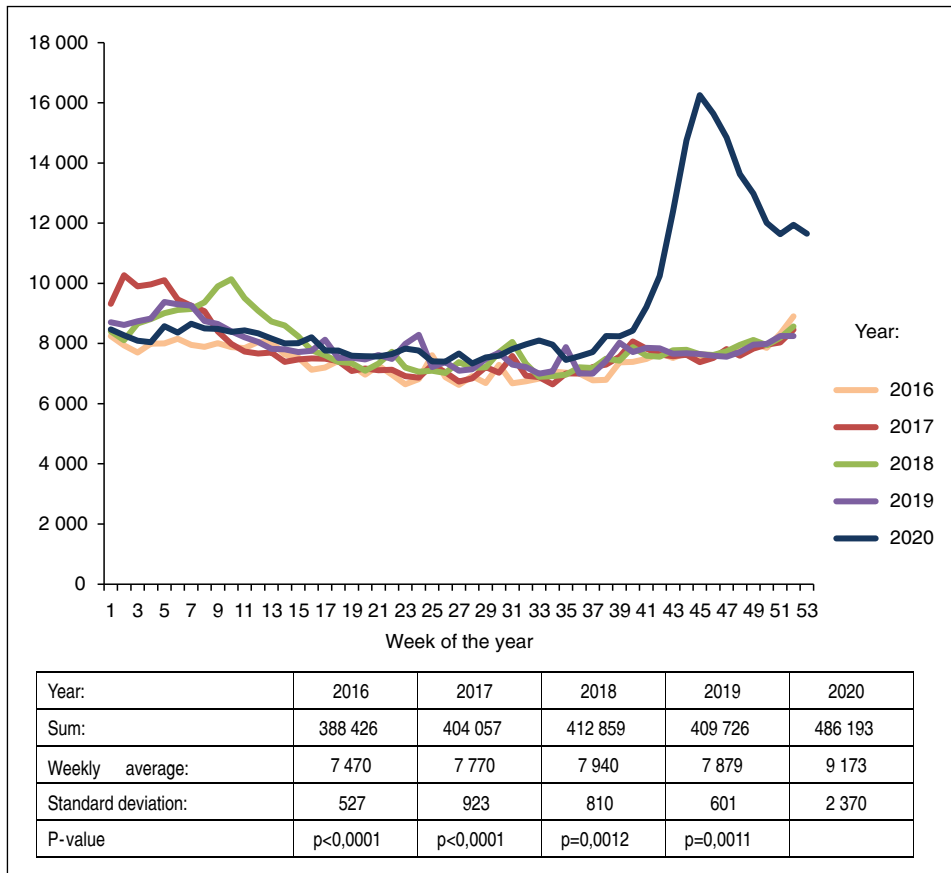


Figure 5. Number of deaths registered in the Polish Registry of Civil Status

Table 1. A detailed list of the monthly number of procedures performed in the department of cardiology, dr A. Jurasz University Hospital no. 1 in Bydgoszcz

Type of procedure	Year	Month												Sum	Monthly average	Standard deviation	P-value
		1	2	3	4	5	6	7	8	9	10	11	12				
Number of performed Transthoracic Echocardiographies	2018	307	226	301	261	308	296	299	279	220	345	308	262	3412	284,33	36,38	P = ns
	2019	317	290	269	328	263	316	310	310	295	325	310	330	3621	301,75	24,30	P = 0,0016
	2020	299	267	224	130	243	283	283	262	293	246	267	251	3048	254,00	44,82	
Number of performed Transesophageal Echocardiographies	2018	33	15	45	42	43	41	40	28	30	48	53	33	451	37,58	10,31	P = ns
	2019	32	32	31	27	23	38	32	49	43	38	55	45	445	37,08	9,42	P = ns
	2020	33	32	23	2	17	40	39	39	46	39	23	11	344	28,67	13,49	
Number of implanted and replaced Cardioverter-defibrillators	2018	14	14	13	8	9	12	9	14	13	21	13	8	148	12,33	3,63	P = ns
	2019	14	14	14	10	9	16	20	13	17	17	19	21	184	15,33	3,73	P = 0,0250
	2020	12	13	11	9	13	16	12	14	14	13	12	10	149	12,42	1,88	
Number of implanted and replaced Pacemakers	2018	17	11	14	15	17	12	14	17	9	11	9	14	160	13,33	2,93	P = ns
	2019	20	11	17	17	11	13	12	17	11	12	17	9	167	13,92	3,48	P = ns
	2020	9	14	13	5	19	15	15	14	19	22	8	7	160	13,33	5,25	
Number of performed Cardiac ablations	2018	18	13	20	18	18	14	12	17	5	20	21	12	188	15,67	4,62	P = ns
	2019	14	20	13	19	11	17	17	22	16	19	32	20	220	18,33	5,37	P = ns
	2020	15	18	10	3	17	20	12	20	20	9	12	6	162	13,50	5,76	
Number of performed coronary angiographies	2018	135	104	141	131	122	120	121	131	106	115	139	107	1472	122,67	12,91	P = ns
	2019	141	107	127	135	139	94	138	130	133	154	124	125	1547	128,92	15,83	P = ns
	2020	135	123	101	69	131	154	140	133	148	128	117	105	1484	123,67	23,28	
Number of performed percutaneous coronary interventions	2018	95	66	86	72	92	86	49	72	61	69	97	67	912	76	15,00	P = ns
	2019	96	68	80	71	88	64	117	83	102	110	81	85	1045	87,08	16,48	P = ns
	2020	79	70	72	41	85	101	92	80	91	97	67	78	953	79,42	16,17	
Number of performed Left Atrial appendage occlusions	2018	5	4	6	8	8	2	5	1	4	4	6	1	54	4,5	2,35	P = 0,0475
	2019	3	1	5	1	2	4	2	2	3	5	4	2	34	2,83	1,40	P = ns
	2020	4	2	2	0	1	7	0	4	5	2	3	0	30	2,5	2,20	

Table 1 cont. A detailed list of the monthly number of procedures performed in the department of cardiology, dr A. Jurasz University Hospital no. 1 in Bydgoszcz

Type of procedure	Year	Month												Sum	Monthly average	Standard deviation	P-value
		1	2	3	4	5	6	7	8	9	10	11	12				
Number of performed MitraClip procedures	2018	0	1	1	1	0	1	2	0	1	3	3	3	16	1,33	1,15	P = ns
	2019	1	0	2	1	2	1	2	5	5	2	2	2	25	2,08	1,51	P = ns
	2020	1	1	0	0	1	2	2	3	2	2	2	2	18	1,5	0,90	
Number of performed fractional flow reserve measurements	2018	18	12	19	13	13	10	15	16	17	11	24	16	184	15,33	3,92	P = ns
	2019	14	11	10	13	14	11	16	13	12	14	19	21	168	14	3,28	P = ns
	2020	28	26	12	4	35	17	18	25	21	21	10	3	220	18,33	9,73	
Number of performed intravascular ultrasound measurements	2018	0	0	1	0	0	2	0	0	1	0	0	0	4	0,33	0,65	P = 0,0002
	2019	1	0	2	1	0	3	3	0	2	0	1	1	14	1,17	1,11	P = 0,0074
	2020	3	4	2	1	4	5	3	3	3	5	2	0	35	2,92	1,51	

Discussion

Our study shows the significant increase in mortality rate in 2020 in comparison with previous analysed years with two most pronounced peaks in April and December which can be explained by the outburst of two waves of COVID-19 pandemic. Data on peaks of the mortality rate in the Department of Cardiology is consistent with the country-wide reports obtained from The Polish Registry of Civil Status. Taking into account the procedures performed throughout 2020, significance was reached in differences in numbers of transthoracic echocardiographies, implanted ICDs and left atrial appendage occlusions. Other differences observed in the performed analysis were only numerical. The significant increase in the rate of intravascular ultrasound, in turn, may be explained by better accessibility of the procedure as a result of its recent reimbursement by the National Health Fund and it should not be correlated to the COVID pandemic

The COVID 19 pandemic affected also the total number of hospitalized patients in the study Clinic. Similar results were observed by Fersia et al. The authors observed a significant decrease in both hospital admissions and performed procedures in the Cardiology Department at Dumfries and Galloway Royal Infirmary [1]. A study by Roffi et al. also showed that the COVID 19 pandemic significantly reduced the number of invasive procedures. The decrease was the greater the less urgent the procedure was [2]. The impact of COVID-19 on cardiac patients was similarly presented by DeFilippis et al. The reorganization of health care structures spurred by the COVID-19 pandemic has significantly affected patients with heart failure, with increased access to telemedicine and cancellation of elective diagnostic and therapeutic procedures [3]. Harky et al. showed that elective coronary treatments and imaging have been largely cancelled across the world to make way for increased resources for COVID-19 patients. Also, the number of hospital patients presenting with coronary symptoms during the outbreak has decreased internationally [4]. Metzler et al. also showed a decline in admissions for percutaneous coronary intervention. The authors estimated that 275 patients were not treated in March and that 110 acute coronary syndrome deaths occurred during this timeframe [5]. The pandemic imposed major changes widely around the world. A review done by Tam et al., showed a significant increase in admission time to a hospital in Hong Kong [6], whereas Baldi et al. showed that the COVID-19 pandemic is significantly correlated to the increase of out of hospital cardiac arrest in Italy [7].

It is worth mentioning that the Department of Cardiology, dr A. Jurasz University Hospital no. 1 in

Bydgoszcz is conducting the ReCOVery-SIRIO Clinical Trial (EudraCT Number: 2020-001951-42), aiming to evaluate the effect of drugs commonly used in cardiology, amiodarone and verapamil on the clinical course of COVID-19. At the time of publication, the study is in progress.

Conclusions

COVID-19 pandemic resulted in functioning changes and an increase of in-hospital mortality in the Department of Cardiology, dr A. Jurasz University Hospital no. 1 in Bydgoszcz. The observed decrease in the number of hospital admissions and specialized cardiac procedures performed in 2020 may have a serious impact on future patients' profile.

Statement of competing interests: *All of the authors declare that they are employees of the hospital which is the subject of the article.*

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