

The increased rate of life-threatening interventions in remotely monitored patients with heart failure during the coronavirus disease 2019 pandemic

Mateusz Tajstra, Anna Kurek, Łukasz Pyka, Mariusz Gąsior

3rd Department of Cardiology, School of Medicine with the Division of Dentistry in Zabrze, Silesian Centre for Heart Diseases, Medical University of Silesia, Katowice, Poland

Introduction The coronavirus disease 2019 (COVID-19) pandemic has become a challenge for healthcare systems around the world. In this extraordinary situation, patients with chronic diseases such as heart failure (HF) are especially at risk and require special attention.¹ The implantation of a cardioverter-defibrillator (ICD) is a procedure which has been used to reduce the mortality in this group of patients for many years.² Over the last years, the introduction of remote monitoring of ICDs and cardiac resynchronization therapy devices (CRT-D defibrillators) has significantly improved the prognosis in patients with HF³ and its role may be even more substantial in the current difficult reality. The aim of the present study was to analyze the rate of life threatening interventions in remotely monitored patients with HF and ICD or CRT-Ds during the first month of the COVID-19 outbreak.

Patients and methods We performed an analysis in consecutive patients with HF enrolled to the Contemporary Modalities in Treatment of Heart Failure Registry (COMMIT-HF)⁴ and who had ICD or CRT-Ds implanted under the care of a dedicated Monitoring Center in a high-volume cardiovascular center. The study compared interventions from a 1-month period beginning with the outbreak of the COVID-19 epidemic in Poland (March 14, 2020) and the corresponding period of 2019. The primary outcome was the overall rate of interventions (arrhythmias, device interventions, and clinical reactions). The percentage of interventions was calculated in relation to the number of supervised patients in the observed periods. The study was approved by an appropriate institutional review board and

a written informed consent was not required given the retrospective nature of the analysis.

Results and discussion We assessed 815 remotely monitored patients in the study period and 1326 patients in the control period. The baseline clinical characteristics including ischemic or nonischemic etiology of HF, history of previous atrial fibrillation, as well as primary or secondary prevention of sudden cardiac death as the reason for ICD implantation and pharmacological treatment were similar within the study groups, except for a higher percentage of diabetes mellitus (36.5% vs 30.9%; $P = 0.017$) and chronic kidney disease stage III to V (29.9% vs 24.0%; $P = 0.018$) in the control group. During the COVID-19 pandemic, there was a significantly higher rate of supraventricular and ventricular arrhythmias (4.91% vs 1.28%; $P < 0.001$), appropriate (0.98% vs 2.21%; $P = 0.02$) and inappropriate (2.33% vs 1.13%; $P < 0.001$) ICD interventions, and clinical reactions (10.31% vs 4.3%; $P < 0.001$), as compared with the control period. An increase in the percentage of all interventions during the pandemic period was found compared to the corresponding period of the previous year (13.37% vs 5.73%; $P < 0.001$; [TABLE 1](#)). Possible reasons for this appear to include the organizational changes in the healthcare system and a greater level of stress among patients.⁵

This study shows a 2.5-fold increase in any intervention in patients with HF and implanted ICD or CRT-Ds during the first months of the COVID-19 outbreak. Remote monitoring may be an effective way to care for patients with HF. Further severity of COVID-19 is expected. Therefore, a broader implementation of remote monitoring care of patients with HF and ICD or CRT-Ds should be considered.

Correspondence to:
Mateusz Tajstra, MD, PhD,
Silesian Centre for Heart Diseases,
ul. Mari Skłodowskiej-Curie 9,
41-800 Zabrze, Poland,
phone: +48 32 373 36 74,
email: mateusztajstra@wp.pl
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TABLE 1 A comparison of clinically important findings from remote monitoring of implantable cardioverter-defibrillator (with or without resynchronization) in patients with heart failure

Variable	Study period ^a (n = 815)	Control period ^b (n = 1326)	P value
Any RM center reaction (ICD intervention and/or clinical reaction)	109 (13.4)	76 (5.73)	<0.001
Appropriate ICD intervention	18 (2.21)	13 (0.98)	0.02
VT	14 (1.72)	11 (0.83)	0.05
ATP during VT	14 (1.72)	7 (0.53)	0.007
Shock during VT	2 (0.25)	3 (0.23)	0.93
VF	5 (0.61)	4 (0.3)	0.27
Shock during VF	5 (0.61)	4 (0.3)	0.29
Inappropriate ICD intervention	19 (2.33)	15 (1.13)	0.03
Any arrhythmia	40 (4.91)	17 (1.28)	<0.001
AF episode	21 (2.58)	5 (0.38)	<0.001
Any clinical reaction	84 (10.3)	57 (4.3)	<0.001
Phone contact	83 (10.18)	56 (4.22)	<0.001
Pharmacotherapy change	16 (1.96)	3 (0.23)	<0.001
Urgent hospitalization	19 (2.33)	13 (0.98)	0.012

Data are presented as number (percentage) of all patients with ICDs and under remote monitoring.

a The study period was defined as the time between the introduction of a state of epidemic as by the Polish government (March 14, 2020) and April 14, 2020.

b The control period was from March 14, 2019 to April 14, 2019.

Abbreviations: AF, atrial fibrillation; ATP, antitachycardia pacing; ICD, implantable cardioverter-defibrillator; RM, remote monitoring; VT, ventricular tachycardia; VF, ventricular fibrillation

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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