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Invasive cardiology procedures in the Silesian Voivodeship compared with the ESC Member Countries

Short title: Invasive cardiology procedures in Silesian Voivodeship and in Europe

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INTRODUCTION

Despite significant improvement in diagnosis and treatment, cardiovascular diseases (CVD), remain the primary cause of death worldwide. Although pharmacological treatment constitutes the primary therapy in the vast majority of CVD, in many of them the invasive procedures have been shown to improve outcomes against optimal medical management [1]. Thus, optimal utilization and access to healthcare resources are mandatory to provide optimal care for patients with CVD. As the fields of interventional cardiology and electrophysiology are expanding substantially in the recent years, with an introduction of more advanced strategies of the management of structural heart diseases, and growing evidence supporting an invasive approach in cardiac arrhythmias, it is important to define their present stage, in order to further accommodate the future needs for patients with CVD [2–4]. The aim of this analysis is to characterize the number of invasive cardiology procedures performed in the Polish Silesian Voivodeship and to juxtapose them with the European statistics, on the basis of the European Society of Cardiology (ESC) Cardiovascular Statistics 2021 report [5].

METHODS

The present analysis has been performed with the use of data obtained from the questionnaires provided by the cardiology wards in the Silesian Voivodeship to the provincial consultant in cardiology. The annual response to the questionnaires is obligatory for every department in the

Voivodeship. Among the information included in the questionnaire, the exact numbers of hospital admissions, as well as of invasive and non-invasive procedures can be found. This study has been focused on the 2019–2021 years. The numbers of all major interventional procedures, including coronary, valvular, electrophysiological, and electrotherapeutical procedures were obtained and divided by the number of Silesian Voivodeship inhabitants.

In order to characterize the reference for the number of procedures performed in the region, and extrapolate them to the supraregional field, the data from the ESC Cardiovascular Statistics 2021 report have been obtained [5]. In the report, the CVD statistics from 57 countries, which are members of the ESC are presented. The document includes a wide spectrum of data, including the prevalence of risk factors, and of established CVD diagnoses, as well as the number of procedures performed in the ESC member countries. The primary source of information regarding the number of procedures, as well as the healthcare resources in the document has been a survey of all 57 ESC national cardiac societies.

The numbers of the respective procedures per 1 million inhabitants in the regions have been presented in the bar graphs. The presented data refer to the number of procedures performed in Silesian Voivodeship and are collated with similar data from Poland, the median number of respective procedures for all ESC member countries, and finally with the country, which reported the highest number of every analyzed procedure. If no data referring to the specific countries were available, the number of procedures performed in the high-income countries, according to the ESC Document, has been presented. The approval of the ethics committee and patient informed consent were not required for the purpose of this study.

RESULTS AND DISCUSSION

The numbers of invasive procedures are summarized in **Figure 1**. In 2019, the number of diagnostic coronary angiographies and percutaneous coronary interventions (PCI) was higher in the Silesian Voivodeship, than the median number of procedures in Europe, as well as in Poland, and in the European countries reporting the most of such procedures. In 2020 and 2021, there has been a decline in the number of coronary angiographies and PCIs, although both procedures were performed more frequently than the median European and Polish average for 2019. The diagnostic coronary angiographies per 1 million inhabitants in Europe have been most frequently performed in Belgium, while Latvia reported most PCIs.

With regard to the number of pacemaker, implantable cardioverter-defibrillator (ICD), and cardiac resynchronization therapy (CRT) device implantations, in 2019, their average number performed per 1 million inhabitants has been higher in the Silesian Voivodeship than the European and Polish statistics. In 2020 and 2021 there has been a decline in the numbers of device implantations, nonetheless, they were performed more frequently than the European and Polish for 2019, and less frequently than in the countries reporting the most of those procedures. Lithuania has been the country which reported the most pacemaker implantations, while most ICD and CRT implantations in Europe have been performed in Germany.

As far as the catheter ablations are concerned, there has been a subtle reduction in their relative number between 2019 and 2020, and a notable growth in 2021 in the Silesian Voivodeship. Nonetheless, the number of ablations in comparison with Germany, which is the European leading country with regard to ablation numbers is still more than 30% lower per 1 million inhabitants.

The number of structural interventions in the region has seen substantial growth between 2019 and 2021, as there were 42.0% more TAVI and 58.0% more percutaneous mitral valve implantations in 2021, although one has to take into consideration the relatively low baseline number of valvular procedures in 2019, when compared with Europe, and especially with the high-income ESC countries.

The presented findings demonstrate that the patients from the Polish Silesian Voivodeship have satisfactory access to the most of invasive cardiology procedures since, in the majority of analyzed categories, the number of such procedures performed annually per 1 million inhabitants was higher than an overall result in Europe and in Poland. Due to COVID-19, almost all non-COVID-related medical admissions had to be reduced to provide care for patients infected with SARS-CoV-2 and reduce the potential viral spread. Thus — especially elective procedures — in either 2020 or 2021, were often postponed or cancelled due to surges in the numbers of patients with COVID-19 [6, 7]. Moreover, the burden of treatment of CVDs was often transferred between the academic, and non-academic facilities, which were often interchangeably transformed into COVID-19 dedicated facilities. The detailed presentation of available invasive procedures performed in the analysed years in academic and non-academic departments is presented in Supplementary material, *Figure S1*, and an increase in the number of catheter ablations performed in non-academic centres in 2021 is clearly visible.

It is noteworthy that the number of coronary angiographies and PCIs in 2019 in Silesian Voivodeship has been higher than in the countries reporting most of such procedures in Europe. The decline in their number in 2020 and 2021 reflects the necessity to transform some of the cardiology units to facilities dedicated to patients with COVID-19, as well as the growing willingness of the physicians to optimize pharmacotherapy, instead of an intervention, on account of the ISCHEMIA trial [8].

Despite COVID-19, there has been a major, 56.4% increase in the number of catheter ablations performed in 2021 in the region, in comparison with 2019. This trend might be explained by the increasing evidence that the early rhythm control strategy results in better clinical outcomes, and lower risk of recurrence of atrial fibrillation than medical therapy [4]. This hypothesis is supported by a 89.8% growth in the number of AF ablations in 2021, what has been a major catalyst for the growth in the overall number of ablations when compared with 2019.

Nonetheless, when comparing the numbers of ablations performed in the Silesian Voivodeship and Germany, one sees a still existent need for wider adoption of ablations into daily practice. Similarly, the numbers of percutaneous valvular interventions demonstrate an unmet need for TAVI and mitral valve implantations in the region, although one has to take into consideration that in the recent years, the reimbursement policy for percutaneous valvular interventions in Poland contributed significantly to the low availability of these procedures.

Finally, the present analysis should be considered in light of a few notable limitations. First, the data from the ESC 2020 Survey, which has been the source of the comparative data presented in the manuscript have not been obtained from all ESC member countries, with an approximately 70% response rate among the member countries. Second, the reported European data come from the median year of 2019, however, in some procedures, the span of the reported years ranged from 2015 to 2019.

Supplementary material

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

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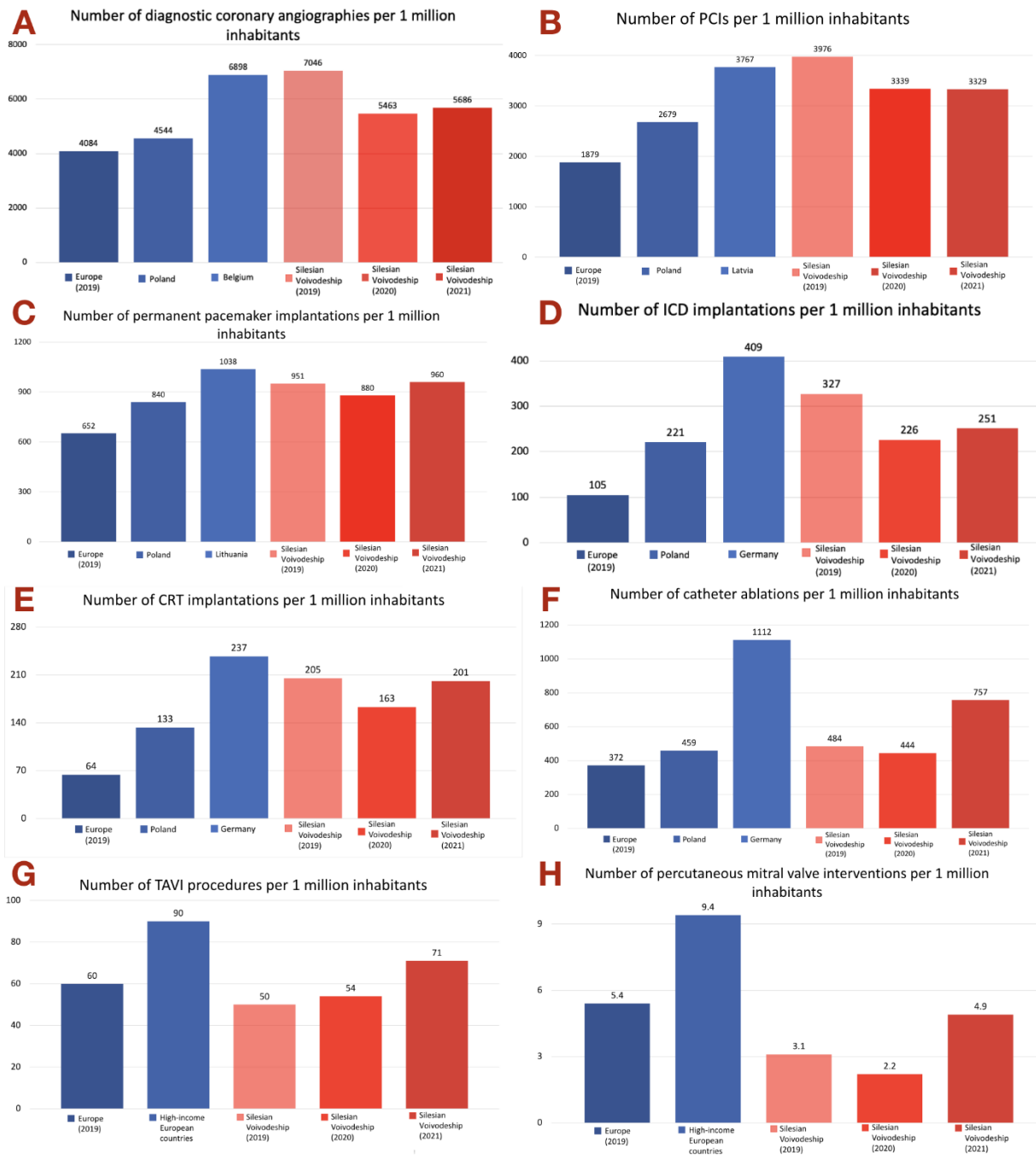


Figure 1. The numbers of interventional procedures in Silesian Voivodeship, compared with the median for the ESC member countries, Poland, and the country which reported the highest relative number of each of analyzed procedures

Footnote: The statistics for Europe describe the median year of data reported for the ESC Survey