

# Interventional cardiology in Poland in 2021. Annual summary report of the Association of Cardiovascular Interventions of the Polish Cardiac Society (AISN PTK) and Jagiellonian University Medical College

Zbigniew Siudak<sup>1</sup>, Stanisław Bartuś<sup>2</sup>, Michał Hawranek<sup>3</sup>, Jacek Kusa<sup>4,5</sup>, Paweł Kleczyński<sup>6</sup>, Krzysztof Milewski<sup>7,8</sup>, Maksymilian P. Opolski<sup>9</sup>, Tomasz Pawłowski<sup>10</sup>, Marcin Protasiewicz<sup>11</sup>, Grzegorz Smolka<sup>12</sup>, Krzysztof P. Malinowski<sup>2</sup>, Dariusz Dudek<sup>13</sup>, Marek Grygier<sup>14</sup>

<sup>1</sup>Collegium Medicum, Jan Kochanowski University, Kielce, Poland

<sup>2</sup>Institute of Cardiology, Jagiellonian University Medical College, Krakow, Poland

<sup>3,3<sup>rd</sup></sup> Department of Cardiology, Faculty of Medical Sciences in Zabrze, Medical University of Silesia, Katowice, Poland

<sup>4</sup>Medical University of Silesia, Katowice, Poland

<sup>5</sup>Regional Specialist Hospital, Wrocław, Poland

<sup>6</sup>Department of Interventional Cardiology, Institute of Cardiology, Jagiellonian University Medical College, John Paul II Hospital, Krakow, Poland

<sup>7</sup>University of Technology, Faculty of Medicine, Katowice, Poland

<sup>8</sup>American Heart of Poland SA, Katowice, Poland

<sup>9</sup>Department of Interventional Cardiology and Angiology, Institute of Cardiology, Warsaw, Poland

<sup>10</sup>Department of Cardiology, Central Clinical Hospital of Internal Affairs, Centre of Postgraduate Medical Education, Warsaw, Poland

<sup>11</sup>Department of Cardiology, Institute of Heart Diseases, Wrocław Medical University, Wrocław, Poland

<sup>12</sup>Department of Cardiology and Structural Heart Diseases, 3<sup>rd</sup> Division of Cardiology, Medical University of Silesia, Katowice, Poland

<sup>13</sup>Digital Medicine and Robotics Center, Jagiellonian University Medical College, Krakow, Poland

<sup>14</sup>1<sup>st</sup> Department of Cardiology, Poznan University of Medical Sciences, Poznan, Poland

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*This paper presents the analysis of individual procedural data from 155 interventional cardiology centres in Poland, which reported their procedures to the National Registry of Procedures of Invasive Cardiology (ORPKI) database in 2021. With regard to NFZ data, we estimate that over 90% of all interventional cardiology procedures in Poland are reported to ORPKI by these centres.*

The 2020 report from the ORPKI database has confirmed the heavy burden of the COVID-19 pandemic on interventional cardiology procedures in Poland [1–3]. The ORPKI database is endorsed by Association of Cardiovascular Interventions of the Polish Cardiac Society (AISN PTK) and is operated daily by the Jagiellonian University Medical College, currently with 155 interventional cardiology centres in Poland reporting. On 31 December 2021 there were 588 PCI operators certified by AISN PTK in Poland.

According to the current analysis of the ORPKI database, in comparison to 2020, there was a substantial

(10%) increase in the total number of coronary angiography (CAG) procedures in Poland in 2021 [1]. There were 144,316 CAGs, which corresponds to 3840 per million inhabitants per year in 2021. The distribution of primary diagnoses as indications for CAG was: 8% ST-elevation myocardial infarction (STEMI), 13% non-ST-elevation myocardial infarction (NSTEMI), 18% UA, and 61% stable angina (a significant (16%) decrease in ACS domination in comparison to 2020). The radial approach was utilized in 90% of all CAG cases, which is a 1% increase in comparison to 2020. Complications of coronary angiography

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## Corresponding author:

Stanisław Bartuś, Institute of Cardiology, Jagiellonian University Medical College, Krakow, Poland, e-mail: [mbbartus@cyfronet.krakow.pl](mailto:mbbartus@cyfronet.krakow.pl)

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in 2021 were rare and corresponded to the rates reported in previous years (Table I).

The total number of PCI procedures was 88,052, which and is 7% higher (2346 percutaneous coronary interventions (PCIs) per million inhabitants per year) than the rate reported in the ORPKI database from 2020. Most of the procedures were done in the setting of acute coronary syndromes (ACS): 38% acute myocardial infarction (19% STEMI and 19% NSTEMI), 24% unstable angina, and the remaining 38% for stable angina. The number of primary PCI per million inhabitants per year is currently 453. There were 16,988 PCIs in STEMI (no change as of 2020) and 16,826 in NSTEMI (a slight decrease). Drug-eluting stents (DES) are used in 99.9% of all cases, which corresponds to 95,413 stents. Rotablation was used in 1327 procedures, which is a 32% increase in comparison to 2020 (1.5% of all PCIs). Aspiration thrombectomy was used in only 1691 STEMI (10% of all PCIs in STEMI) cases. We observed

**Table I.** Complications of coronary angiography in Poland in 2021

Parameter	%	In comparison to 2020
Death	0.21	↓
Stroke	0.03	↑
Major bleeding at access site	0.02	↓
Sudden cardiac arrest	0.16	↔
Allergic reaction	0.02	↑

**Table II.** Complications of PCI in Poland in 2021

Parameter	%	In comparison to 2020
Death:	0.33	↓
STEMI	0.8	
NSTEMI	0.3	
UA	0.08	
SA	0.02	
Myocardial infarction	0.11	↔
Major bleeding from access site	0.07	↓
Sudden cardiac arrest	0.35	↔
Allergic reaction	0.01	↔
Artery perforation	0.28	↑
No reflow	0.66	↔

**Table III.** Additional intracoronary assessment in 2021 during angiography and PCI

Parameter	n	% of all angio and PCI	% change from 2020
FFR	10323	11	↑ 23
IVUS	5295	6.0	↑ 35
OCT	491	0.6	↑ 105

a similar use of ticagrelor as an adjunct pharmacotherapy both for STEMI (55%) and NSTEMI (27%) with the use of prasugrel less than 1.1% in either indication. In terms of complex procedures, the number of chronic total occlusion (CTO) procedures was 1813, approaching only 2.1% of all PCIs (6% increase compared to 2020), with final TIMI 3 flow achieved in 67% of cases. PCI complications are still rare; they are presented in Table II. During the COVID-19 pandemic 1% (8030) of all procedures were performed in SARS-CoV2-positive patients. Additionally, there were 1691 thrombectomies in STEMI, which is a 10% rise since 2020.

A substantial increase in the use of adjunctive imaging and diagnostic tools during CAG and PCI was observed in 2021 vs. 2020 (Table III).

Structural procedures are a growing part of interventional cardiology in Poland, and they are mainly performed by certified interventional cardiologists. Following recommendations of the European Society of Cardiology, 29 multidisciplinary heart teams involving 36 certified interventional cardiologists were established in all 29 transcatheter aortic valve implantation (TAVI) centres (including 4 new ones that started a TAVI programme in 2021). There were 2083 TAVI procedures performed in 29 centres (more than 95% from femoral access). Evolut/Evolut Pro (Medtronic, USA) heart valves were implanted in 994 patients, Sapien 3/Sapien 3 Ultra (Edwards Lifesciences, USA) in 448 patients, Acurate Neo/Neo 2 (Boston Scientific, USA) in 378, Portico/Navitor (Abbott, USA) in 156 patients, MyValve (Merill, India) in 52 patients, and Hydra (SMT, India) in 27 patients. In total, 150 TAVI procedures (7.2%) were done with the use of the Sentinel cerebral protection system (Boston Scientific, USA). Although the total number of TAVI significantly increased (by 436 procedures (26.5%)) when compared to 2020, Poland, with a rate of 54.8 TAVI procedures per million inhabitants in 2021, is still below the European average.

There were 29 procedures of pulmonary valve implantation, including Melody (Medtronic, USA) in 19 patients and Sapien 3 (Edwards Lifesciences, USA) in 10 patients. Transcatheter edge-to-edge procedures (TEER) on mitral valves were performed in 15 centres in 256 patients with the use of 237 MitraClips (Abbott, USA) and 19 Pascal systems (Edwards Lifesciences, USA). TEER procedures were also done in 19 patients on tricuspid valves using the newly introduced TriClip system (Abbott, USA). There was also one Tricvalve Transcatheter Bicaval system implantation (OrbusNeich, USA) in a patient with severe tricuspid regurgitation. Although the year-to-year growth in TEER procedures is significant (a 51% increase in comparison to 2020), it should be mentioned that the rate in Poland, at about 6.7 TEER procedures per million inhabitants, is far below the clinical needs.

A total of 633 left atrial appendage closure procedures were performed in 28 centres, including 324 Watchman

FLX (Boston Scientific, USA), 302 Amulet (Abbott, USA), and 9 Lambre (Lifetech, China). The number of LAA closure procedures increased by almost 39% (year to year).

Recent studies and changes in guidelines established the role of PFO closure in routine practice as a secondary prevention in patients after embolic stroke of unknown source, not only among cardiologists but also neurologists – there were 1050 PFO closure procedures done last year (a 48% increase in comparison to 2020). Additionally, 584 ASD II closure procedures were done in 2021 by interventional cardiologists (an increase of about 34% in comparison to 2020).

Some new structural heart procedures were also done in 2021, including implantation of 11 Coronary Sinus Reducers (Neovasc, Canada) in patients with refractory angina and 14 Atrial Flow Regulators (AFR) (Occlutech, Sweden) in patients with heart failure or pulmonary hypertension.

The ORPKI database has been the source material for 13 manuscripts published in PubMed in 2021.

In summary, the COVID-19 pandemic has had an immense impact on the number of interventional cardiology procedures in 2020, but the consequences were still present in 2021. We observed an increase in both the number of CAGs and PCIs as well as modern imaging and flow assessment techniques. The numbers of most of the structural procedures (TAVI, TEER, LAA closure, ASD, PFO) showed a significant increase in 2021, partially because of relaxing of COVID restrictions, but one should remember that the numbers of TAVI and TEER procedures are still far below the European average and they fall short of the current clinical needs in Poland.

### Conflict of interest

The authors declare no conflict of interest.

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