Preliminary results from the Polish Infective Endocarditis Registry (POL-ENDO): Time to change clinical practice?

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ABSTRACT

Background: Infective endocarditis (IE) is a severe valvular disease associated with high morbidity and mortality.

Aims: This preliminary study aimed to evaluate patient profiles and treatment outcomes of IE in Poland and compare them with European IE characteristics.

Methods: We conducted a prospective multicenter observational cohort study — the POL-ENDO registry – in IE patients from 134 hospitals in Poland recruited between August 2022 and August 2023. We evaluated demographic, clinical, imaging, and treatment outcome data. A comparison of the Polish patients with those assessed in the EURO-ENDO registry between January 2016 and March 2018 was performed.

Results: Of a total of 880 IE patients, 622 were male (70.7%). The POL-ENDO participants were older (61.4 [16.7] years vs. 59.25 [18.03] years; $P = 0.001$). Native-valve IE occurred more often in Poland (82.3% vs. 56.6%; $P < 0.001$). Transthoracic echocardiography was performed more frequently in Poland (93.6% vs. 89.8%; $P < 0.001$). New imaging techniques (computed tomography/magnetic resonance imaging/positron emission tomography/single-photon emission computed tomography) were less frequently used in Poland (computed tomography: 41.3% vs. 53.2%; $P < 0.001$; magnetic resonance imaging: 6.4% vs. 18.7%; $P < 0.001$). Heart failure occurred more often in Poland as an in-hospital complication (31.4% vs. 14.1%; $P < 0.001$). Surgical treatment was less frequently performed in Poland (36.9% vs. 51.2%; $P < 0.001$). In-hospital mortality was higher in Poland (21% vs. 17%; $P = 0.008$).

Conclusion: Polish IE patients were significantly older and had more comorbidities. New imaging techniques are less frequently used in Poland. Echocardiography was performed more frequently in Poland as the diagnostic mainstay. Surgical treatment was significantly less frequent in Poland. In-hospital mortality in Poland is higher.

Key words: infective endocarditis, Poland, registry, valvular disease

INTRODUCTION

Infective endocarditis (IE) is an inflammatory disease that develops as a result of the presence of microorganisms, primarily in the endocardium, and is associated with high morbidity and mortality. Annual incidence is estimated to be 3–10/100 000 of the population. Despite advances in diagnosis techniques and treatment modalities, it remains life-threatening, and mortality reach-

WHAT'S NEW?

To our knowledge, this is the largest study to present characteristics of patients with infective endocarditis (IE) in clinical practice in Poland, as well as the first comparison of the Polish and European IE clinical profiles reported previously. Our preliminary study of 880 patients showed that IE in Poland affects more often men around 60 years of age than women. Polish patients are significantly older and have more comorbidities than other inhabitants of European countries. Native valve IE as well as recurrent IE occurred more often in Poland. Polish patients were characterized by worse overall health status as reflected by more comorbidities with almost double prevalenced of heart failure and more often implanted cardiac devices, which can predispose to IE recurrence. Transthoracic echocardiography and transesophageal echocardiography were performed more frequently as the diagnostic mainstay. Notably, in-hospital mortality was significantly higher in Poland.

es up to 30% at 30 days. Explanations for this still poor prognosis can be a delayed diagnosis and treatment, as well as continuously increasing the number of prosthetic valves and cardiac devices, which predispose to IE [1–3].

Individual studies demonstrated that the clinical profile of IE has changed over the past few decades [4, 5]. They have shown that several factors have evolved over time, including risk factors, etiology, and high prevalence of IE cases caused by nosocomial infections [6, 7]. Data on the IE in Poland are very limited. There were single-center studies and mainly retrospective analyses in Poland with significant limitations, including a small number of recruited patients published. Płońska-Gościniak et al. [8] evaluated in the Pol-CDRIE registry the IE profile in Poland but included 195 cardiac device-related IE cases. Dąbek et al. [9], in their five-year observation, tried to describe the Polish IE profile, but it was a single-center study with only 45 patients. There has never been a comparative study of Polish and European IE characteristics.

This preliminary study aimed to evaluate patient profiles and treatment outcomes of IE in Poland based on the POL-ENDO registry and compare Polish and European IE characteristics based on already published data from the ESC-EORP EURO-ENDO registry. Therefore, we preliminary analyzed consecutive IE patients admitted during one year by the Polish hospitals participating in the study as part of the POL-ENDO to identify the current profile and treatment outcomes of patients diagnosed with IE in Poland. Additionally, the results were juxtaposed with the EURO-ENDO registry outcomes to compare Polish and European IE characteristics.

METHODS

Study and data collection methods

The POL-ENDO registry is a large prospective multicenter observational study of patients with definite or possible IE diagnoses from several Polish hospitals. The registry was launched in January 2022, when the first patient was reported. Data analyzed in this study was obtained during one year of collection. The POL-ENDO registry is still ongoing with a continuously increasing number of records entered by the involved hospitals.

The hospitals were asked to document, for more than one year, medical histories of adult (above 18 years old) hospitalized patients with a possible or definite IE diagnosis according to the 2015 European Society of Cardiology (ESC) IE guidelines.

The results of the POL-ENDO registry were compared to the already published data of the ESC-EORP EURO-ENDO registry. The EURO-ENDO registry included a cohort study of 3116 adult patients (2470 from Europe, 646 from non-ESC countries), admitted to 156 hospitals in 40 countries between January 2016 and March 2018 with IE diagnosis according to the same 2015 ESC IE guidelines. The ESC-EORP EURO-ENDO registry included 39 (1.25%) patients from hospitals in Poland [1, 10].

Collected data

Data collected in the POL-ENDO registry includes patient demographics and clinical characteristics, type of the treating center, microbiological profile, laboratory data, treatment before and during hospitalization, imaging data, performed surgical and non-surgical procedures, indications for cardiac surgery, complications, and in-hospital mortality.

Legal approval

The POL-ENDO registry was established by a regulation of the Ministry of Health of the Republic of Poland No. DZ.U.2019.2131 of 16 October 2019. A patient consent was waived due to the observational nature of the registry.

Statistical analysis

All results for binary variables were presented as counts and percentages, and the χ^2 test of independence or Fisher's exact test were used for the comparison of proportions. Continuous variables were expressed as means and standard deviations, and the significant differences between the means of the two groups were assessed using Student's t-test. All hypotheses were two-tailed with a *P*-value of 0.05. All statistical analyses were performed using SAS statistical software, version 9.4 (SAS Institute, Cary, NC, US).

RESULTS

We analyzed selected preliminary data of 880 patients from the cardiac centers involved, who had been admitted between August 2022 and August 2023.

Table 1. Study group demographics and clinical characteristics

	POL-ENDO registry (n = 880)	EURO-ENDO registry (n = 3116)	*P*-value
Age, years, mean (SD)	61.4 (16.7)	59.25 (18.03)	0.001
Age ≥80 years	81/880 (9.3%)	375/3116 (12.0%)	0.03
BMI mean (SD), kg/m^2	25.9 (4.9)	25.8 (6.4)	0.72
Females	258/880 (29.3%)	969/3116 (31.1%)	0.31
Type of IE			
NVIE	724/880 (82.3%)	1764/3116 (56.6%)	<0.001
PVIE	179/880 (20.3%)	939/3116 (30.1%)	<0.001
CDRIE	101/880 (11.5%)	308/3116 (9.9%)	0.27
Localization of IE			
Aortic valve	449/841 (53.4%)	1514/3056 (49.5%)	0.048
Mitral valve	303/841 (36.0%)	1284/3056 (42.0%)	0.002
Electrode	97/841 (11.5%)	333/3056 (10.9%)	0.6
Tricuspid valve	75/841 (8.9%)	349/3056 (11.4%)	0.04
Pulmonary valve	6/841 (0.7%)	74/3056 (2.4%)	0.002
Other	57/841 (6.8%)	119/3056 (3.9%)	<0.001
Risk factors			
Hypertension	476/859 (55.4%)	1502/3111 (48.3%)	<0.001
Diabetes	227/859 (26.4%)	704/3109 (22.6%)	0.02
Chronic kidney disease	198/859 (23.1%)	553/3113 (17.8%)	<0.001
Smoking	126/859 (14.7%)	759/2938 (25.8%)	<0.001
Previous stroke/TIA	105/859 (12.2%)	340/2860 (11.9%)	0.79
Alcohol abuse	73/859 (8.5%)	228/3003 (7.6%)	0.38
COPD/asthma	67/859 (7.8%)	318/3111 (10.2%)	0.03
Cancer	95/855 (11.1%)	361/3088 (11.7%)	0.64
Hypo/hyperthyroidism	59/859 (6.9%)	226/2820 (8.0%)	0.27
Dialysis	34/859 (4.0%)	163/3113 (5.2%)	0.13
Intravenous drug abuse	29/859 (3.4%)	212/3067 (6.9%)	<0.001
Steroid therapy	22/859 (2.6%)	127/2840 (4.5%)	0.01
HIV	1/859 (0.1%)	31/3038 (1.0%)	0.01
History of cardiovascular diseases, comorbidities			
Heart failure	465/860 (54.1%)	662/2840 (23.3%)	<0.001
Coronary artery disease	235/860 (27.3%)	622/2897 (21.5%)	<0.001
Atrial fibrillation	227/860 (26.4%)	767/2918 (26.3%)	0.95
Previous IE	161/871 (18.5%)	274/3116 (8.8%)	<0.001
Congenital heart disease	50/860 (5.8%)	365/3114 (11.7%)	<0.001
HOCM	2/860 (0.2%)	63/2840 (2.2%)	<0.001
Implanted devices			
Total	182/867 (21.0%)	537/3116 (17.2%)	0.01
Pacemaker	102/867 (11.8%)	325/3116 (10.4%)	0.27
ICD	52/867 (6.0%)	125/3116 (4.0%)	0.01
CRT	28/867 (3.2%)	87/3116 (2.8%)	0.499

Abbreviations: BMI, body mass index; CDRIE, cardiac device-related infective endocarditis; COPD, chronic obstructive pulmonary disease; CRT, cardiac resynchronization therapy; HIV, human immunodeficiency virus; HOCM, hypertrophic obstructive cardiomyopathy; ICD, implantable cardioverter-defibrillator; IE, infective endocarditis; NVIE, native-valve infective endocarditis; PVIE, prosthetic-valve infective endocarditis; TIA, transient ischemic attack

Five hundred seventy-one patients (65.1%) were enrolled in cardiology wards, 140 (16%) in internal medicine wards, 90 (10.3%) in cardiac surgery wards, 22 (2.5%) in intensive care units, and 54 patients in other wards (6.1%). Most patients (557; 63.4%) were emergency admissions.

Study group demographics and characteristics

The precise characteristics of the study group are shown in Table 1. Among 880 patients, there were 622 men (70.7%) and 258 women (29.3%), and the mean age was 61.4 (16.7) years. There were 81 patients (9.3%) ≥80 years old. The POL-ENDO participants, in comparison to EURO-ENDO participants, were older (61.4 [16.7] years vs. 59.25 [18.03] years; $P = 0.001$); nevertheless, there were fewer patients ≥80 years (9.3% vs. 12%; $P = 0.03$). IE in the POL-ENDO registry was definite in 60.6% and possible in 39.4%, in contrast to the EURO-ENDO registry where definite IE accounted for 83.8% of cases and possible IE for 16.2%.

Of 880 patients, 82.3% had native-valve IE (NVIE), 20.3% had prosthetic-valve IE (PVIE), and intracardiac device-related IE was observed in 11.5% of patients. NVIE occurred more often in Poland (82.3% vs. 56.6%; $P < 0.001$), in contrast to PVIE, which predominated in EURO-ENDO participants (20.3% vs. 30.1%; $P < 0.001$). Aortic valves were affected most often, followed by mitral valves in both study groups;

Table 2. Clinical picture and electrocardiographic features

	POL-ENDO registry (n = 880)	EURO-ENDO registry (n = 3116)	*P*-value
Signs and symptoms			
Fever >38°	420/854 (49.2%)	2383/3068 (77.7%)	<0.001
Dyspnea	350/854 (41.0%)	1016/3065 (33.1%)	<0.001
Cardiac murmur	234/854 (27.4%)	2008/3112 (64.5%)	<0.001
Chest pain	101/854 (11.8%)	248/3065 (8.1%)	<0.001
Cough	96/854 (11.2%)	522/3068 (17.0%)	<0.001
Cerebral embolism	47/854 (5.5%)	350/3116 (11.2%)	<0.001
Peripheral embolism	34/854 (4.0%)	92/3116 (2.9%)	0.003
Syncope	27/854 (3.2%)	81/3068 (2.6%)	0.41
Electrocardiographic features			
Sinus rhythm	644/840 (76.7%)	2228/2922 (76.2%)	0.80
Atrial fibrillation	186/840 (22.1%)	484/2922 (16.6%)	<0.001
Other rhythms	10/840 (1.2%)	169 / 2922 (5.8%)	<0.001
1st degree AV conduction block	12/840 (1.4%)	232/2878 (8.1%)	<0.001
2nd degree AV conduction block	6/840 (0.7%)	17/2878 (0.6%)	0.69
3rd degree AV conduction block	14/840 (1.7%)	82/2878 (2.8%)	0.06

Abbreviations: AV, atrioventricular; CNS, central nervous system

however, the aortic valve was more often affected in the Polish population (53.4% vs. 49.5%; $P = 0.048$), in contrast to the mitral valve, which was invaded more frequently in patients from the European registry (36% vs. 42%; $P = 0.002$).

Risk factors were analyzed; the most prevalent was arterial hypertension (476 patients; 55.4%), followed by diabetes (227 patients; 26.4%). Hypertension was more prevalent in the Polish population (55.4% vs. 48.3%; $P < 0.001$). Active or past SARS-CoV-2 infections were also examined and were observed in 82 patients (9.5%). History of substance abuse was evaluated; alcohol abuse was observed in 73 patients (8.5%), followed by intravenous drug abuse (IVDA) in 29 patients (3.4%). IVDA prevailed in the EURO-ENDO registry (3.4% vs. 6.9%; $P < 0.001$).

Comorbidities were also monitored in our study group. IE was more frequently observed in patients with heart failure (HF) (465 patients; 54.1%). The Polish population was more often affected by HF (54.1% vs. 23.3%; $P < 0.001$), contrary to congenital heart diseases, which were more frequently observed in the European registry (5.8% vs. 11.7%; $P < 0.001$). Previous IE was more often reported in the Polish population (18.5% vs. 8.8%; $P < 0.001$).

Cardiac implantable devices were present in 182 patients (21%), with predominance in Polish patients (21.0% vs. 17.2%; $P = 0.01$). Pacemakers were implanted in 11.8% of patients, 3.2% had cardiac resynchronization therapy, and 6% had implantable cardioverter-defibrillators.

The history of previous cardiosurgical, cardiological, and non-cardiological interventions was also analyzed. In our study group, 275 patients (33.2%) underwent surgical treatments; the most prevalent procedure was surgical aortic valve replacement (SAVR) with implantation of a bioprosthesis (12.6%), followed by SAVR with implantation of a mechanical valve prosthesis (7.6%). Cardiological interventions were performed in 152 patients (18%), with a predominance of percutaneous coronary intervention (12.4%), followed by transcatheter aortic valve implantation (2.6%).

Non-cardiological interventions were observed in a medical history of 158 patients (18.5%), with surgical treatment (7.9%) and dental treatment (7.2%) predominating, followed by colonoscopy (1.6%).

Clinical picture and electrocardiographic features

The detailed clinical characteristics of the study group are shown in Table 2. The most frequent symptom in the POL-ENDO was fever >38°, with predominance in the European population (49.2% vs. 77.7%; $P < 0.001$). Embolic events were more predominant in the EURO-ENDO registry, specifically cerebral embolism (5.5% vs. 11.2%; $P < 0.001$). Additionally, our patients were assessed according to the New York Heart Association Functional Classification system, and the patients with functional classes III and IV were the most prominent group (41%). Regarding electrocardiographic features, atrial fibrillation was more frequent in the POL-ENDO (22.1% vs. 16.6%; $P < 0.001$). In the Polish population, atrioventricular blocks were observed less often (3.8% vs. 11.5%; $P < 0.001$).

Imaging methods

The exact characteristics of performed imaging methods are shown in Table 3; among them, echocardiographic examinations were used most frequently.

Transthoracic echocardiography (TTE) was performed more frequently in the Polish population (93.6% vs. 89.8%; $P < 0.001$), followed by transesophageal echocardiography (TEE) (65.2% vs. 58.1%; $P < 0.001$). The Polish population was characterized by lower left ventricular ejection fraction (52.0 ± 13.4% vs. 55.6 ± 12.0%; $P < 0.001$).

The second most used imaging diagnostic method was computed tomography (CT), which was less often

Table 3. Imaging modalities

	POL-ENDO registry (n = 880)	EURO-ENDO registry (n = 3116)	*P*-value
TTE	789/843 (93.6%)	2793/3111 (89.8%)	<0.001
TEE	548/841 (65.2%)	1808/3111 (58.1%)	<0.001
LVEF, %	52.0 ± 13.4	55.6 ± 12.0	<0.001
CT	348/843 (41.3%)	1656/3113 (53.2%)	<0.001
MRI	54/843 (6.4%)	581/3113 (18.7%)	<0.001
PET	21/842 (2.5%)	518/3113 (16.6%)	<0.001

Abbreviations: CT, computed tomography; LVEF, left ventricular ejection fraction; MRI, magnetic resonance imaging; PET, positron emission tomography; TEE, transesophageal echocardiography; TTE, transthoracic echocardiography

Table 4. In-hospital complications

	POL-ENDO registry (n = 880)	EURO-ENDO registry (n = 3116)	*P*-value
Congestive heart failure	260/829 (31.4%)	439/3116 (14.1%)	<0.001
Acute kidney injury	150/829 (18.1%)	550/3116 (17.7%)	0.77
Embolic events	97/829 (11.7%)	641/3116 (20.6%)	<0.001
Cardiogenic shock	86/829 (10.4%)	190/2840 (6.7%)	<0.001
Thrombocytopenia (<100 000/μl)	75/829 (9.0%)	216/2840 (7.6%)	0.18
Septic shock	70/829 (8.4%)	289/3116 (9.3%)	0.46
Increase in vegetation size	35/829 (4.2%)	201/3116 (6.5%)	0.02
Positive blood cultures	33/829 (4.0%)	413/3088 (13.4%)	<0.001
New abscess	23/829 (2.8%)	193/3116 (6.2%)	<0.001
Atrioventricular conduction block	22/829 (2.6%)	128/2840 (4.5%)	0.02
Hemorrhagic stroke	21/829 (2.5%)	79/3116 (2.5%)	0.99
Spondylitis	10/829 (1.2%)	145/3116 (4.7%)	<0.001
Nephritis	9/829 (1.1%)	89/3097 (2.9%)	0.03
Mycotic aneurysm	8/829 (1.0%)	58/3116 (1.9%)	0.07

Table 5. Embolic complications

	POL-ENDO registry (n = 880)	EURO-ENDO registry (n = 3116)	*P*-value
Stroke	54/97 (55.7%)	168/641 (44.1%)	0.03
Spleen	21/97 (21.6%)	139/641 (21.7%)	0.99
Pulmonary	15/97 (15.5%)	171/641 (26.7%)	0.02
Peripheral	12/97 (12.4%)	60/641 (9.4%)	0.35
Renal	6/97 (6.2%)	58/641 (9.0%)	0.35
Transient ischemic attack	5/97 (5.1%)	27/641 (4.2%)	0.6
Coronary	3/97 (3.1%)	20/641 (3.1%)	1.00
Hepatic	0/97 (0.0%)	11/641 (1.7%)	0.38

performed in POL-ENDO participants (41.3% vs. 53.2%; *P* <0.001). In CT-examined POL-ENDO patients, chest CT was most often obtained (57.1%), followed by head CT (47.3%) and abdomen CT (34.6%). CT results were also evaluated for valvular and extravalvular changes. Considering valvular changes, vegetations (19.6%) and pseudoaneurysms (5.6%) were most prominent. In the group of extravalvular changes, central nervous system ischemia (15.9%) was most often observed.

Magnetic resonance imaging (MRI) was used less frequently in Poland in comparison to EURO-ENDO participating countries (6.4% vs. 18.7%; *P* <0.001). Head MRIs were most common in Poland (56.6%) followed by spine MRIs (26.4%).

We also evaluated nuclear imaging methods. Positron emission tomography (PET) was performed in 21 patients (2.5%), followed by single-photon emission computed tomography (SPECT) in 5 patients (0.6%).

Complications

Complex events that occurred during hospitalization are shown in Table 4. The most prominent one in Poland was HF, and it occurred more frequently in comparison to EURO-ENDO participating countries (31.4% vs. 14.1%; *P* <0.001). Cardiogenic shock developed with greater frequency in Polish patients (10.4% vs. 6.7%; *P* <0.001).

Embolic events, which were diagnosed more commonly in the EURO-ENDO participants (11.7% vs. 20.6%; *P* <0.001),

were more precisely evaluated in POL-ENDO, which is shown in Table 5.

In-hospital death occurred in 170 patients, which was more often than among EURO-ENDO participants (21% vs. 17%; $P = 0.008$).

Three hundred thirty-three POL-ENDO patients (40.2%) did not develop any in-hospital complications.

Surgical treatment

Surgical treatment was less often performed in POL-ENDO participants (36.9% vs. 51.2%; $P < 0.001$). The most frequent procedures were SAVR with implantation of a mechanical valve (33.9%), followed by SAVR with implantation of a biological valve (32.6%). In 2.1% of patients, valve surgery was performed along with coronary artery bypass grafting. Among them, emergency surgery was performed in 11% of cases, urgent surgery in 37.7%, and elective surgery in 51.3%.

DISCUSSION

The POL-ENDO is the first extensive holistic multicenter registry of infective endocarditis in Poland. The data from POL-ENDO provide a remarkable opportunity to evaluate and assess the IE profile, including clinical characteristics, predisposing factors, management, complications, and outcomes for IE patients in Poland. Moreover, our registry has the potential to compare Polish and European clinical IE profiles and offers chances to improve IE diagnosis and therapy.

The mean age of IE patients diagnosed in Poland is increasing and is higher in comparison to Europe. Dąbek et al. [9], in their five-year observational study of Polish patients enrolled between 2009 and 2013, showed that their mean age was 53.6 years. The EURO-ENDO registry indicated the mean age of IE patients as 59.3 years [1]. The POL-ENDO showed that the mean age of IE patients in the Polish population was 61.4 years, which is higher compared to both studies. The increasing incidence of IE in older patients can result from population aging in developed countries [11, 12]. Older patients usually have more comorbidities, more often have previous cardiac and cardiosurgical procedures, and often have implanted cardiac devices that predispose them to infections. The proportion of definite IE, according to Duke criteria, was lower in the Polish population. Among others, this may have resulted from the reduced availability and less frequent use of diagnostic imaging methods other than TTE. NVIE occurred significantly more often in Poland (82.3% vs. 58.6%), which points to the importance of pre-existing comorbid conditions, such as diabetes mellitus, irrespective of the presence of prosthetic heart valves [13]. Similarly, the POL-ENDO registry participants were older, with a much higher joint prevalence of HF, hypertension, chronic kidney disease, and diabetes mellitus, additionally with significantly more often implanted cardiac devices. Notably, although the average age of Polish IE subjects was higher by over 2 years, nevertheless, the percentage of patients ≥80 years old in the EURO-ENDO registry had also increased by about 30%, which presumably reflects the higher mean age of the European population.

As to the type of valve involved, the aortic valve was most commonly affected in both Polish and European IE registries, although the predominance of aortic valve involvement was more pronounced in Polish patients. IE on the right heart valves was approximately 40% more frequent in European IE subjects, probably due to a 2-fold greater proportion of IVDA. IVDA is also the likely explanation for a significantly higher prevalence of pulmonary embolism in the EURO-ENDO registry (26.7%) compared to the POL-ENDO registry (15.5%).

Importantly, IE recurrence was over twice as common in Polish patients compared to European counterparts. Curiously, the prevalence of IVDA and maintenance hemodialysis – recognized risk factors for the recurrence of IE [14] — was lower in the POL-ENDO cohort compared to the European population. On the other hand, Polish IE patients were characterized by a greater overall comorbidity burden, especially over 2-fold more frequent history of heart failure as well as significantly higher proportions of traditional cardiovascular risk factors, coronary artery disease diagnoses, implanted cardiac devices or in-hospital atrial fibrillation episodes, all of which can predispose to IE recurrence.

TTE, and especially TEE, were significantly more often performed in Poland. The ESC recommendations for echocardiography use in IE outlined the key role of echocardiography in diagnosis and prognostic assessment of IE patients. TTE should be performed immediately to confirm or rule out IE [15]. New imaging techniques (CT/MRI/PET/SPECT) were less frequently used in Poland. Regardless of the probable underutilization, in Poland, of these modern imaging techniques, one may hypothesize that they were used more often in European IE subjects but at the expense of the TEE. These novel diagnostic tools should be perceived as a supplement to but not a substitute for TTE/TEE to optimize IE diagnosis and management. In particular, shadowing of valvular calcifications or mechanical valves on echocardiography may prevent visualization of paravalvular abscesses that can be revealed on CT, contrary to paravalvular leakages, which are better evaluated by echocardiography [16]. Published studies showed that combining TTE, TEE, and CT improves sensitivity of detecting valvular and perivalvular IE complications [17, 18]. According to 2023 ESC guidelines for the management of endocarditis, fluorodeoxyglucose [FDG] PET/CT has a class I indication in relation to the diagnosis of PVIE and pocket infections after implantation of cardiac devices [19]. The availability of modern imaging methods is limited mainly to referral centers. Some studies demonstrated that late FDG PET/CT imaging for PVIE predisposes to false positive results, therefore, it should be evaluated with caution [20]. Analysis of in-hospital complications in POL-ENDO pointed out a significantly lower incidence of

embolic events and abscesses despite higher in-hospital mortality. The POL-ENDO study did not produce a broad understanding of how many asymptomatic embolic complications occurred. Another published study showed that FDG PET/CT imaging was useful in detecting embolic IE complications [21]. Increasing the use of new imaging techniques in IE diagnostic processes can be a crucial step in decreasing in-hospital mortality, nevertheless, it has to be strictly monitored, with echocardiography as the IE diagnosis mainstay.

Surgery was significantly less often performed in Polish patients despite a remarkably higher incidence of such indications for surgical treatment as cardiogenic shock, congestive heart failure, and stroke. In our study, the impact of surgical treatment on mortality of IE patients was not evaluated due to incomplete data. However, an already published study showed that early surgical intervention is a protective factor against mortality, especially for NVIE [22] which is much more prevalent in Polish IE patients. Early surgical treatment, in comparison to conventional therapeutic methods, significantly reduces in-hospital mortality [23]. The POL-ENDO study found an inverse association between in-hospital mortality and valve surgery. To reduce in-hospital mortality and overcome therapeutic inertia, surgery should be performed without delay when indicated. The recent ESC guidelines for endocarditis management highlighted the importance of the Endocarditis team, which includes also cardiac surgeons [24]. This multidisciplinary approach may have a beneficial effect on patient outcomes and should be implemented in IE centers in Poland.

Limitations

We cannot guarantee that all the participating centers included their IE cases consecutively and prospectively. The POL-ENDO registry is still ongoing, with a continuously increasing number of records provided by the involved centers. In this study, we presented preliminary data, not final results.

CONCLUSIONS

The principal conclusions from the POL-ENDO registry can be listed as follows: 1) IE affects more predominantly men around 60 years of age; 2) Polish IE patients are significantly older and had more comorbidities than other Europeans; 3) IE recurrence is significantly more common in the Polish population; 4) Echocardiography was performed significantly more often in Poland as the IE diagnostic mainstay, contrary to new imaging techniques (CT/MRI/PET/SPECT), which were less frequently used; 5) Surgical treatment was undertaken less frequently in Polish IE patients; 6) In-hospital mortality was significantly higher in Poland.

Article information

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