

# Current patterns of antithrombotic and revascularisation therapy in patients hospitalised for acute coronary syndromes. Data from the Polish subset of the EPICOR study

Izabela Wojtkowska<sup>1\*</sup>, Janina Stępińska<sup>1\*</sup>, Małgorzata Stępień-Wojno<sup>1</sup>, Mateusz Sobota<sup>2</sup>, Jerzy Kopaczewski<sup>3</sup>, Zygfryd Reszka<sup>4</sup>, Michał Kurzelewski<sup>5</sup>, Jesus Medina<sup>6</sup>

<sup>1</sup>Department of Intensive Cardiac Care Clinic, Institute of Cardiology, Warsaw, Poland; <sup>2</sup>Department of Cardiology, Autonomous Public Healthcare Complex, Sandomierz, Poland; <sup>3</sup>Department of Cardiology with Unit of Pacemaker Implantation, Provincial Hospital, Włocławek, Poland; <sup>4</sup>Department of Cardiology, Intensive Cardiac Unit, Provincial Integrated Hospital, Elbląg, Poland; <sup>5</sup>AstraZeneca Pharma Poland, Warsaw, Poland; <sup>6</sup>Medical Evidence and Observational Research, Global Medical Affairs, AstraZeneca, Madrid, Spain

\*Both authors equally contributed to the article.

## Abstract

**Background:** Cardiovascular disease is the leading cause of mortality and morbidity in developed countries, including Poland. Antithrombotic drugs play a crucial role in the management of acute coronary syndromes (ACS). Recent clinical trials have demonstrated the efficacy and safety profiles of new antiplatelet and anticoagulant agents, which may be used as add-on therapy or replacements for older drugs. The long-term follow-up of antithrombotic management patterns in acute coronary syndrome patients (EPICOR) is a prospective international observational study (NCT01171404) designed to describe the use of antithrombotic management strategies for the treatment of ACS during the acute phase and over a follow-up period of up to two years from the index event. A total of 608 patients from 26 hospitals in Poland were enrolled into the registry between September 2010 and March 2011.

**Aim:** The aim of this work was to summarise data on pre-hospital and in-hospital and revascularisation therapy in 608 patients enrolled into the registry in Poland.

**Methods:** The registry collected the records of patients who were hospitalised for ACS within 24 h of symptom onset and who had a final diagnosis of unstable angina (UA), non-ST-segment elevation myocardial infarction (NSTEMI), or ST-segment elevation myocardial infarction (STEMI), and survived to discharge.

**Results:** Among 608 enrolled patients, 291 had a final diagnosis of STEMI and 317 had a final diagnosis of NSTEMI/UA. Patients with NSTEMI/UA were generally at higher cardiovascular risk than patients with STEMI. Before admission to the hospital antiplatelet drugs (acetylsalicylic acid [ASA] and/or clopidogrel) were administered more frequently to STEMI than to NSTEMI/UA patients. Glycoprotein (GP) IIb/IIIa inhibitors were used in almost half of the STEMI patients and in nearly 10% of NSTEMI/UA patients. The combinations of antiplatelet drugs included ASA + clopidogrel (predominantly in NSTEMI/UA) or ASA + clopidogrel + GPIIb/IIIa inhibitor (predominantly in STEMI), while other possible combinations were not used. Almost all STEMI patients (96.2%) and the clear majority of NSTEMI/UA patients (73.8%) were subjected to percutaneous coronary intervention (PCI), while coronary artery bypass grafting was performed in only 2.5% of the NSTEMI/UA patients. At the time of discharge from hospital almost all patients with STEMI received ASA together with clopidogrel, but this strategy was used only in 91.5% of patients with NSTEMI/UA ( $p < 0.05$ ). Unfractionated heparin was used in 62% of patients, low-molecular weight heparin in 35%, fondaparinux in 0.7%, and bivalirudin in none of the studied patients.

**Conclusions:** Among patients with ACS enrolled to the EPICOR study in Poland, antiplatelet therapy was started in the pre-hospital phase in approximately one-third of the STEMI patients and in one out of ten of the NSTEMI/UA patients. The initial antiplatelet therapy was mostly based on ASA + clopidogrel and was followed by a combination of ASA + clopidogrel + GPIIb/IIIa inhibitor. Other drugs or combinations, as well as novel antiplatelet drugs, were only used exceptionally. Almost 10% of NSTEMI/UA patients did not receive dual antiplatelet therapy at discharge. PCI plays a dominating role in the first-line treatment for the patients enrolled to this registry in Poland.

**Key words:** acute coronary syndrome, registry, EPICOR

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## Address for correspondence:

Izabela Wojtkowska, MD, PhD, Department of Intensive Cardiac Care Clinic, Institute of Cardiology, ul. Alpejska 42, 04–628 Warszawa, Poland, e-mail: izabelawojt@op.pl

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## INTRODUCTION

Cardiovascular disease is the leading cause of mortality and morbidity in developed countries, including Poland. The number of cardiovascular deaths has declined over recent years; however, cardiovascular disease remains the most important cause of mortality and morbidity in Poland. Lowering cardiovascular mortality has been attributed to correction of risk factors [1] and to improved availability of optimised treatment of acute coronary syndromes (ACS). In 2012, there were 149 percutaneous coronary intervention (PCI) centres located all over Poland, including 130 (87%) with 24-h service, giving a ratio of 3.9 PCI centres per one million inhabitants, representing a good European standard [2, 3].

Antithrombotic drugs play a crucial role in the management of ACS. Recent clinical trials have demonstrated the efficacy and safety profiles of new antiplatelet and anticoagulant agents, which may be used as add-on therapy or replacements for older drugs, as outlined in European Society of Cardiology (ESC) guidelines on: myocardial revascularisation [4]; ST-segment elevation myocardial infarction (STEMI) [5]; and non-ST-segment elevation myocardial infarction (NSTEMI) [6]. It is therefore interesting to study current patterns of antithrombotic drug usage in Polish hospitals for treatment of ACS.

The best available evidence on treatment patterns of Polish patients with ACS is provided by the PL-ACS registry [7], but this registry primarily involves leading cardiology centres in Poland (with 24-h cath lab facilities) [8]. Besides, only limited data concerning pharmacological treatment have been recently published [9].

The long-term follow-up of antithrombotic management patterns in acute CORonary syndrome patients (EPICOR) is a prospective international observational study (NCT01171404) designed to describe the use of antithrombotic management strategies for the treatment of ACS during the acute phase and over a follow-up period of up to two years from the index event. There were 608 patients from 26 hospitals in Poland enrolled into the registry between September 2010 and March 2011.

The aim of this work was to present data on pre-hospital and in-hospital antiplatelet and revascularisation therapy in 608 patients enrolled into the registry in Poland.

## METHODS

### Study process

The rationale, design, and aim of the EPICOR study (NCT01171404) were described previously [10]. Briefly, this was a multinational, multicentre, observational, prospective, longitudinal cohort study, which included patients hospitalised for ACS within 24 h of symptom onset and who had a final diagnosis of unstable angina (UA), STEMI, or NSTEMI and survived to discharge from the hospital. The study enrolled 10,568 patients at 555 sites in 20 countries from the following regions: North Western Europe, South Western Europe,

Eastern Europe/Turkey, and Latin America. Patients' data were collected during initial hospital stay, and additionally the patients were followed-up for up to two years after the index event.

This paper presents data on pre- and in-hospital antithrombotic and revascularisation treatment of 608 patients enrolled into the registry in 26 study centres in Poland. The list of all participating centres in Poland is provided in [Appendix \(see journal website, supplementary file\)](#).

### Patients

**Inclusion criteria.** The study enrolled adult patients hospitalised for, NSTEMI/UA or STEMI. Diagnosis of UA required that patients had: a) symptoms of angina at rest or on minimal exercise, b) ST-T segment changes, and c) lack of significant increase in biomarkers of necrosis but objective evidence of ischaemia by non-invasive imaging or significant coronary stenosis (at angiography). The patients were hospitalised within 24 h of onset of symptoms or were transferred from another hospital within 24 h of the onset of symptoms. Diagnosis of STEMI required: a) history of chest pain/discomfort, b) persistent ST-segment elevation ( $> 30$  min) of  $\geq 0.1$  mV in two or more contiguous electrocardiogram (ECG) leads or presumed new left bundle branch block (LBBB) on admission, and c) elevation of cardiac biomarkers (CK-MB, troponins): at least one value above the 99<sup>th</sup> percentile of the upper reference limit. Criteria for NSTEMI diagnosis were: a) history of chest pain/discomfort, b) lack of persistent ST-segment elevation, LBBB, or intraventricular conduction disturbances, and c) elevation of cardiac biomarkers (CK-MB, troponins): at least one value above the 99<sup>th</sup> percentile of the upper reference limit. All patients provided written, informed consent for participation in the study.

**Exclusion criteria.** Patients were not eligible to participate if any of the following exclusion criteria were present: a) STEMI, NSTEMI, UA precipitated by or as a complication of surgery, trauma, gastrointestinal bleeding, or post-PCI, or occurring in patients already hospitalised for other reasons, b) the presence of any condition/circumstance that, in the opinion of the investigator, could have significantly limited the complete follow-up of the patient, c) prior enrolment in the EPICOR study, d) the presence of serious/severe co-morbidities in the opinion of the investigator, which may have limited short term (i.e. six-month) life expectancy, and e) current participation in a clinical trial.

### Study centres

Selection of the study centres was performed based on comprehensive lists of hospitals for each participating country. The lists were obtained from national authorities, local scientific societies, or professional associations, depending on the local availability of this type of information. All efforts were made to approach and select sites/physicians for the study if

**Table 1.** Use of antiplatelet drugs before hospital admission

|  | STEMI (n = 291) | NSTEMI/UA (n = 317) | Total (n = 608) |
|--|-----------------|---------------------|-----------------|
| ASA administered before hospital admission         | 110 (37.8%)     | 33 (10.4%)*         | 143 (23.5%)     |
| Median dose  | 300 mg          | 300 mg              |                 |
| Clopidogrel administered before hospital admission | 81 (27.8%)      | 23 (7.3%)*          | 104 (17.1%)     |
| Median dose  | 600 mg          | 600 mg              |                 |

\*P < 0.05 for comparison between ST segment elevation myocardial infarction (STEMI) and non-ST segment elevation myocardial infarction (NSTEMI)/unstable angina (UA); ASA — acetylsalicylic acid

**Table 2.** Revascularisation

|   | STEMI (n = 291) | NSTEMI/UA (n = 317) | Total (n = 608) |
|---|-----------------|---------------------|-----------------|
| Coronary angiography                            | 288 (99.0%)     | 300 (94.6%)*        | 588 (96.7%)     |
| PCI   | 280 (96.2%)     | 234 (73.8%)*        | 514 (84.5%)     |
| Bare-metal stents                               | 227 (78.8%)     | 151 (50.3%)         | 378 (64.3%)     |
| Drug-eluting stents                             | 52 (18.1%)      | 81 (27.0%)          | 133 (22.6%)     |
| Thrombolytic therapy                            | 0 (0.0%)        | 0 (0.0%)            | 0 (0.0%)        |
| Time from symptoms to first medical contact [h] | 4.18 ± 5.86     | 4.27 ± 4.78         | 4.69 ± 5.62     |
| Time from symptoms to first PCI [h]             | 6.28 ± 9.74     | 33.01 ± 35.41*      | 18.42 ± 28.24   |
| CABG  | 0 (0.0%)        | 8 (2.5%)*           | 8 (1.3%)        |

\*P < 0.05 for comparison between ST segment elevation myocardial infarction (STEMI) and non-ST segment elevation myocardial infarction (NSTEMI)/unstable angina (UA); CABG — coronary artery bypass grafting; PCI — percutaneous coronary intervention

they could provide a representative sample. The minimum number of consecutive patients with a diagnosis of STEMI or NSTEMI/UA that each site could include was 10. The first patient was enrolled on 1<sup>st</sup> September 2010, and the last visit of the last patient took place on 31<sup>st</sup> March 2013. Most centres were non-clinical community hospitals (61% of all centres), followed by non-university general hospitals (31%). University general hospitals and other types of hospital represented 4% of study centres each. Almost 89% of study centres had cath lab facilities, and 19% had cardiac surgery on site.

### Statistical analysis

Sample size calculations and description of statistical analysis for the total EPICOR population has already been described [10, 11]. In the present analysis, descriptive statistics of variables were analysed. The Pearson's  $\chi^2$  test or Fisher's exact test were used to compare qualitative variables between groups. For quantitative variables, since only the number of observations, mean, and standard deviation were provided, normal distribution was assumed and Welch's t-test was used. Analysis was performed using the software Statistica 9.0PL.

### RESULTS

Of 608 enrolled patients, 291 had a final diagnosis of STEMI and 317 had a final diagnosis of NSTEMI/UA. Patients with NSTEMI/UA were generally at higher cardiovascular risk than

patients with STEMI: they had higher prevalence of hypertension, hypercholesterolaemia, chronic angina, history of myocardial infarction, heart failure or atrial fibrillation, except for smoking, which was found to be less frequent.

Before admission to the hospital antiplatelet drugs (acetylsalicylic acid [ASA] and/or clopidogrel) were administered more frequently to STEMI than NSTEMI/UA patients (Table 1). None of the patients enrolled received a new antiplatelet drug (prasugrel or ticagrelor) in the pre-hospital phase. None of the enrolled patients was initially treated with the fibrinolytic therapy.

After admission to the hospital, cardiac catheterisation was performed in almost all patients. As many as 96% of STEMI and almost 74% of NSTEMI/UA patients (p < 0.05 for comparison between the groups) subsequently underwent PCI. Most patients who underwent PCI received bare metal stents. Thrombolysis was not used as a form of reperfusion, and coronary artery bypass grafting (CABG) was performed only in a few patients with NSTEMI/UA (Table 2).

Table 3 presents data on antithrombotic drugs used in patients in the hospital phase. Nearly all patients received ASA and clopidogrel, and the clear majority continued maintenance treatment with these drugs. The loading dose of ASA was 300 mg. Of other oral antiplatelet drugs ticlopidine and prasugrel were used exceptionally. Glycoprotein (GP) IIb/IIIa inhibitors were used in almost half of STEMI patients and in

**Table 3.** Antithrombotic drugs used in patients with acute coronary syndrome

|                        | STEMI (n = 291) | NSTEMI/UA (n = 317) | Total (n = 608) |
|------------------------|-----------------|---------------------|-----------------|
| ASA:                   |                 |                     |                 |
| Any                    | 287 (98.6%)     | 315 (99.4%)         | 602 (99.0%)     |
| Maintenance treatment  | 255 (87.6%)     | 294 (92.7%)         | 549 (90.3)      |
| Clopidogrel:           |                 |                     |                 |
| Any                    | 289 (99.3%)     | 308 (97.2%)         | 597 (98.2%)     |
| Maintenance treatment  | 249 (85.6%)     | 264 (83.3%)         | 513 (84.4%)     |
| Prasugrel              | 3 (1.0%)        | 2 (0.6%)            | 5 (0.8%)        |
| Ticlopidine            | 1 (0.3%)        | 1 (0.3%)            | 2 (0.3%)        |
| GPIIb/IIIa inhibitors: |                 |                     |                 |
| Abciximab              | 110 (37.8%)     | 14 (4.4%)*          | 124 (20.4%)     |
| Eptifibatide           | 23 (7.9%)       | 15 (4.7%)*          | 38 (6.3%)       |
| Anticoagulants         | 227 (78.0%)     | 253 (79.8%)         | 480 (78.9%)     |
| LMWH                   | 62 (21.3%)      | 151 (47.6%)         | 213 (35.0%)     |
| Unfractionated heparin | 203 (69.8%)     | 173 (54.6%)         | 376 (61.8%)     |
| Fondaparinux           | 1 (0.3%)        | 3 (0.9%)            | 4 (0.7%)        |
| Bivalirudin            | 0 (0.0%)        | 0 (0.0%)            | 0 (0.0%)        |
| Warfarin/acenocoumarol | 4 (1.4%)        | 16 (5.0%)           | 20 (3.3%)       |
| Dabigatran             | 0 (0.0%)        | 0 (0.0%)            | 0 (0.0%)        |

\*P < 0.05 for comparison between ST segment elevation myocardial infarction (STEMI) and non-ST segment elevation myocardial infarction (NSTEMI)/unstable angina (UA); ASA — acetylsalicylic acid; GP — glycoprotein; LMWH — low-molecular weight heparin

**Table 4.** Antiplatelet therapy at discharge

|                   | STEMI (n = 291) | NSTEMI/UA (n = 317) | Total (n = 608) |
|-------------------|-----------------|---------------------|-----------------|
| ASA               | 290 (99.7%)     | 315 (99.4%)         | 605 (99.5%)     |
| Clopidogrel       | 288 (99.0%)     | 290 (91.5%)*        | 578 (95.1%)     |
| ASA + clopidogrel | 287 (98.6%)     | 290 (91.5%)*        | 577 (94.9%)     |
| Ticlopidine       | 0 (0.0%)        | 1 (0.3%)            | 1 (0.2%)        |
| Prasugrel         | 1 (0.3%)        | 1 (0.3%)            | 2 (0.3%)        |

\*P < 0.05 for comparison between ST segment elevation myocardial infarction (STEMI) and non-ST segment elevation myocardial infarction (NSTEMI)/unstable angina (UA); ASA — acetylsalicylic acid

nearly 10% of NSTEMI/UA patients. The combinations of the antiplatelet drugs that were used included ASA + clopidogrel (predominant in NSTEMI/UA) or ASA + clopidogrel + GPIIb/IIIa inhibitor (predominant in STEMI), while other possible combinations were not used.

At the time of discharge from hospital almost all patients with STEMI received ASA together with clopidogrel, but this strategy was used only in 91.5% of patients with NSTEMI/UA ( $p < 0.05$ ). Other antiplatelet drugs were only sporadically used at discharge (ticlopidine: one patient, prasugrel: two patients) (Table 4).

## DISCUSSION

The cornerstone of the pharmacological treatment of ACS, including both STEMI and NSTEMI/UA, is combined antiplate-

let and anticoagulant therapy, which in concomitance with intracoronary interventions is aimed at successful restoration of myocardial perfusion. As shown in recent clinical investigations and registers, the use of antiplatelet and anticoagulant therapies has undergone significant change over the years.

Understanding of the significance of the thrombogenic mechanisms in the pathogenesis of ACS stimulated numerous clinical investigations that have shown benefits of aggressive antiplatelet and anticoagulant therapy in patients with ACS. This led to the development of new medications aimed at improved efficacy and reduced side effects, allowing adjustment of the therapeutic regimen for a specific clinical situation.

According to the ESC guidelines, all patients with ACS should receive a combination antiplatelet/antithrombotic

**Table 5.** Baseline characteristics of the patients

|   | STEMI (n = 291) | NSTEMI/UA (n = 317) | Total (n = 608) |
|---|-----------------|---------------------|-----------------|
| Age [years]                             | 60.4 ± 10.79    | 63.7 ± 10.78        | 62.1 ± 10.9     |
| Males                                   | 74.6%           | 64.7%*              | 69.4%           |
| Body mass index                         | 27.6 ± 4.82     | 28.4 ± 4.29*        | 28.0 ± 4.57     |
| Presence of cardiovascular risk factors | 74.9%           | 88.0%*              | 81.7%           |
| Hypertension                            | 54.6%           | 79.2%*              | 67.4%           |
| Hypercholesterolaemia                   | 33.3%           | 50.5%*              | 42.3%           |
| Type 2 diabetes mellitus                | 13.7%           | 23.0%*              | 18.65           |
| Family history of CAD                   | 31.3%           | 25.9%               | 28.5%           |
| Current smoking                         | 52.2%           | 30.0%*              | 40.65           |
| Obesity (BMI > 30 kg/m <sup>2</sup> )   | 27.8%           | 29.3%               | 28.65           |
| History of myocardial infarction        | 10.3%           | 34.4%*              | 22.9%           |
| Chronic angina                          | 13.1%           | 40.7%*              | 27.5%           |
| Heart failure                           | 4.8%            | 16.4%*              | 10.9%           |
| History of TIA/stroke                   | 3.4%            | 6.3%                | 4.9%            |
| Atrial fibrillation                     | 3.1%            | 9.8%*               | 6.6%            |
| Peripheral artery disease               | 4.1%            | 8.5%                | 6.4%            |

\*P < 0.05 for comparison between ST segment elevation myocardial infarction (STEMI) and non-ST segment elevation myocardial infarction (NSTEMI)/unstable angina (UA); BMI — body mass index; CAD — coronary artery disease; TIA — transient ischaemic attack

therapy (IA) [3–5]. Introduction of new medications, as well as modification and broadening of the indications for older drugs, makes it possible to individualise patients' therapy to improve the outcome.

In Poland, there are currently two ongoing national registries: PL-ACS (including the whole spectrum of ACS patients treated either invasively or non-invasively) and the Polish National PCI Registry (only patients treated with percutaneous interventions). Annual reports from the latter are published each year by the Polish Association of Cardiovascular Interventions of the Polish Cardiac Society (PCS) [12, 13]. Detailed reporting of invasive procedures in all active invasive cardiology centres and managed at a national level by the PCS has resulted in data on almost 1.5 million catheterisations and PCIs over a period of seven calendar years (2005–2011).

The EPICOR study was a multinational, multicentre, observational, prospective, longitudinal cohort study, aimed at evaluation of the of the clinical approaches to the treatment of ACS in a spectrum of cardiology centres [10, 11]. The study collected and evaluated data from 20 countries across Europe and Latin America for a total of 10,568 patients treated in 555 hospitals. In Poland 26 centres took part in the study, and data from 608 patients (422/69.4% men and 186/30.6% women) were analysed. The mean age of the Polish cohort was 61 years, which was similar to the mean age of patients enrolled in other countries. Patients with NSTEMI/UA were generally at higher cardiovascular risk than patients with STEMI, i.e. they had higher prevalence of hypertension, hypercholesterolaemia, chronic angina, history

of myocardial infarction, heart failure, or atrial fibrillation, except for smoking, which was found to be less frequent. Baseline characteristics are shown in Table 5.

The EPICOR study has shown the dominating role of PCI in the first line of treatment for ACS in Poland. As many as 96.2% of STEMI and 73.8% of NSTEMI/UA patients were treated with primary PCI, while in the remaining countries involved in the EPICOR study this ratio was significantly lower: 49.3% for STEMI and 40.9% for NSTEMI/UA patients [11]. At the time when the EPICOR study was conducted, none of the enrolled patients in Poland was initially treated with fibrinolytic therapy. In contrast, in other countries this type of initial treatment is used in 17.3% of patients with ACS, with the most frequently used agent being tenecteplase (used in 7.9% of patients with ACS) [11]. This observed predominance of a primary invasive approach in Poland seems to be related to high availability of this therapy. At the time when the EPICOR study was conducted, there were 140 cath labs in Poland. From 2002 to 2012 the number of coronary angiography procedures in Poland was 217,126 and the number of coronary angioplasty procedures was 119,746 [2, 12, 13]. However, the system of transfer of patients initially admitted to hospitals without cath labs needs to be time-optimised because in these cases the first medical contact — balloon time is significantly longer than, for example, in Germany [14]. With the advance and availability of PCI in Poland, cardiac surgery is no longer considered the therapy of choice in most patients with ACS. This therapy is now chosen mostly when atherosclerotic coronary lesions are found to be more

disseminated. In the analysed cohort, CABG was infrequent and was only performed in NSTEMI/UA patients.

The ESC guidelines on STEMI (2008) and NSTEMI/UA (2007), which were in force at the time of EPICOR data collection, recommended initial treatment with ASA and clopidogrel in the loading doses (in STEMI class IB, IC in NSTEMI class IA, IA recommendations) [15, 16]. Current 2015 ESC guidelines recommend the initial loading ASA dose of 150–300 mg p.o. (or 80–150 mg i.v.) followed by a maintenance daily dose of 75–100 mg, life-long, irrespective of the treatment strategy (I/A). The inhibitors of the P2Y<sub>12</sub> can be used in combination with ASA if they are not contraindicated due to increased risk of bleeding (I/A). Ticagrelor (180 mg loading dose, 90 mg twice daily) is recommended, in the absence of contraindications, for all patients at moderate-to-high risk of ischaemic events (e.g. elevated cardiac troponins), regardless of initial treatment strategy and including those pretreated with clopidogrel (which should be discontinued when ticagrelor is started) (IB). Prasugrel (60 mg loading dose, 10 mg daily dose) is recommended in patients who are proceeding to PCI if there are no contraindications (IB) [3–5, 17].

The EPICOR study has shown that before admission to the hospital antiplatelet drugs (ASA and/or clopidogrel) were administered more frequently to STEMI than to NSTEMI patients (Table 1). None of the patients enrolled received a new antiplatelet drug (prasugrel or ticagrelor) in the pre-hospital phase. None of the enrolled patients was initially treated with fibrinolytic therapy. The loading dose of ASA was the same across all countries, but the maintenance dose was lower in Poland (75 mg/day) than in other countries (100 mg). In addition, in other countries the newer antiplatelet medications like prasugrel were used more frequently than in Poland (for STEMI: 1.0% vs. 11.5% vs.; for NSTEMI/UA: 0.6% vs. 4.6%) [11]. This was probably related to the fact that these newer antiplatelet drugs are relatively unavailable for patients due to reimbursement of the drugs in Poland. Moreover, ticagrelor was registered for use in Europe in December 2010 [18], after enrolment of patients to the EPICOR registry had started. Use of prasugrel has been shown to be much lower in Eastern Europe (1%) than in Northern (13.1%) and Southern (9.1%) parts of the continent.

In the Polish cohort of the EPICOR registry the antiplatelet therapy was initiated in pre-hospital phase in one-third of STEMI patients and in one-tenth of NSTEMI patients. Anticoagulants available for the treatment of ACS in Poland include unfractionated heparin (UFH), low-molecular weight heparins (LMWH), fondaparinux, and bivalirudin. As shown in the EPICOR study, in Poland the most frequently used anticoagulant (comparing to other countries) in STEMI patients was UFH (61.8% vs. 41.7%) followed by LMWH (35.0% vs. 44.5%) [11]. The remaining anticoagulants like fondaparinux or bivalirudin were used in Poland significantly less often than in

other countries both for STEMI (fondaparinux: 0.3% vs. 7.7%; bivalirudin: 0% vs. 2.5%) and NSTEMI/UA (fondaparinux: 0.9% vs. 13%; bivalirudin: 0% vs. 0.8%) patients [11]. The 2011 ESC guidelines for the management of NSTEMI suggested fondaparinux as the preferred anticoagulant [6]. In the the newest 2014 ESC guidelines on myocardial revascularisation, bivalirudin was indicated as the preferred agent (I/A), but only as alternative for UFH during PCI in combination with GPIIb/IIIa inhibitor [3, 4].

The presence of the thrombus in the coronary artery in a patient with ACS is an indication for administering GPIIb/IIIa inhibitor. Agents available in Poland include abciximab, eptifibatide, and tirofiban. According to the EPICOR study, abciximab was used in this setting in 37.8% of STEMI patients, and eptifibatide in 7.9%. Comparing this same data in a summary report of the Association of Cardiovascular Interventions of the PCS, the use of GPIIb/IIIa in 2011 was: eptifibatide — 58% and abciximab — 41% (relative value) [2, 12].

The most frequently used combination antiplatelet therapy was ASA + clopidogrel. In over one third of STEMI patients, a GPIIb/IIIa inhibitor was added. Other combinations of antiplatelet drugs were used only exceptionally, and this was probably caused not only by lower availability but also by lack of reimbursement of such therapy, as discussed above.

Of note is the fact that almost 10% of NSTEMI/UA patients did not receive dual antiplatelet therapy at discharge. The EPICOR study has shown the real-life picture of ACS treatment in Poland and in Europe. Based on its data, we can state that most patients with ACS receive modern guideline-recommended reperfusion therapy (mostly PCI). However, the study indicates also some room for further improvement, including wider use of early antithrombotic treatment in the pre-hospital phase, shortening of the initial evaluation phase especially in patients with STEMI (FMC to PCI time was almost 3 h).

Continuous progress in medical technologies gives hope for the development of new medications with improved benefit to risk ratio and improved biocompatibility of the intracoronary stents for safer and patient-oriented treatment.

### **Limitations of the study**

The most important limitations of this study are relatively small sample size, the limited number of study centres in Poland, and the fact that this is a secondary analysis of a larger, international study. Consequently, this analysis was not powered to provide a thorough description of patients with ACS treated in Poland, and any generalisation of the data presented in this paper to the overall population of patients with ACS in Poland needs to be performed with caution. Also, the enrolment to the registry took place in 2010–2011, and since that time the patterns of antithrombotic drug usage might have undergone some changes.

## CONCLUSIONS

Among patients with ACS enrolled to the EPICOR study in Poland, antiplatelet therapy was started already in the pre-hospital phase in approximately one-third of the STEMI patients and in one in ten of the NSTEMI/UA patients. The initial antiplatelet therapy was mostly based on ASA + clopidogrel and was followed by a combination of ASA + clopidogrel + GPIIb/IIIa inhibitor. Other drugs or combinations, as well as novel antiplatelet drugs, were only used exceptionally. Almost 10% of NSTEMI/UA patients did not receive dual antiplatelet therapy at discharge. PCI plays a dominant role in the first-line treatment for the patients enrolled to this registry in Poland.

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# Zastosowanie leczenia przeciwplatekowego i rewaskularyzacji u pacjentów z ostrym zespołem wieńcowym. Dane z polskiego rejestru EPICOR

Izabela Wojtkowska<sup>1\*</sup>, Janina Stępińska<sup>1\*</sup>, Małgorzata Stępień-Wojno<sup>1</sup>, Mateusz Sobota<sup>2</sup>, Jerzy Kopaczewski<sup>3</sup>, Zygfryd Reszka<sup>4</sup>, Michał Kurzelewski<sup>5</sup>, Jesus Medina<sup>6</sup>

<sup>1</sup>Klinika Intensywnej Terapii Kardiologicznej, Instytut Kardiologii, Warszawa; <sup>2</sup>Oddział Kardiologii, Samodzielny Publiczny Zespół Zakładów Opieki Zdrowotnej, Sandomierz; <sup>3</sup>Oddział Kardiologii z Ośrodkiem Wszczepiania Stymulatorów, Szpital Wojewódzki, Włocławek; <sup>4</sup>Oddział Kardiologii z Intensywnym Nadzorem Kardiologicznym, Wojewódzki Szpital Zespolony, Elbląg; <sup>5</sup>AstraZeneca Pharma Poland, Warszawa; <sup>6</sup>Medical Evidence and Observational Research, Global Medical Affairs, AstraZeneca, Madryt, Hiszpania

\*Obie autorki w równym stopniu przyczyniły się do powstania niniejszego artykułu.

## Streszczenie

**Wstęp:** Choroby układu sercowo-naczyniowego stanowią główną przyczynę zgonów w krajach rozwiniętych, w tym w Polsce. Leki przeciwplatekowe odgrywają zasadniczą rolę w leczeniu ostrych zespołów wieńcowych (ACS). Wyniki ostatnio przeprowadzonych badań wykazały skuteczność i bezpieczeństwo nowych leków przeciwplatekowych i przeciwzakrzepowych, które mogą być dodawane do terapii lub mogą zastępować starsze preparaty. Rejestr EPICOR (long-term follow-up of antithrombotic management patterns in acute coronary syndrome patients) był prospektywnym, międzynarodowym badaniem (NCT01171404), które przedstawiło strategię postępowania u osób z ACS, zarówno w ostrej fazie choroby, jak i 2 lata później. Do badania włączono 608 chorych z 26 szpitali w Polsce między wrześniem 2010 a marcem 2011 r.

**Cel:** Celem badania było przedstawienie strategii postępowania w fazie przedszpitalnej i szpitalnej oraz rewaskularyzacji u pacjentów z ACS w Polsce.

**Metody:** Do rejestru włączono chorych z ACS w ciągu 24 godzin od początku wystąpienia bólu, u których ostatecznie rozpoznano dławicę niestabilną (UA), zawał serca bez uniesienia odcinka ST (NSTEMI) i zawał serca z uniesieniem odcinka ST (STEMI), i którzy przeżyli do momentu wypisania ze szpitala.

**Wyniki:** Spośród 608 włączonych pacjentów u 291 stwierdzono STEMI, u 317 — NSTEMI/UA. Pacjenci z NSTEMI/UA należeli do grupy wyższego ryzyka chorób sercowo-naczyniowych niż osoby ze STEMI. Przed wypisaniem ze szpitala leki przeciwplatekowe (kwas acetylosalicylowy [ASA] i/lub klopidogrel) były częściej przyjmowane przez chorych ze STEMI niż z NSTEMI/UA. Inhibitory glikoproteiny (GPIIa/IIIb) były stosowane w połowie przypadków w STEMI i prawie w 10% w NSTEMI/UA. Wykorzystywano połączenia leków przeciwplatekowych, w tym ASA + klopidogrel (szczególnie u osób z NSTEMI/UA) lub ASA + klopidogrel + inhibitor GPIIa/IIIb (szczególnie u osób ze STEMI); inne możliwe połączenia nie były stosowane. W momencie wypisania ze szpitala prawie wszyscy pacjenci ze STEMI otrzymywali ASA razem z klopidogrelem, ale ta strategia była stosowana tylko u 91,5% chorych z NSTEMI/UA ( $p < 0,05$ ).

**Wnioski:** Spośród pacjentów z ACS włączonych do rejestru EPICOR w Polsce leczenie przeciwplatekowe było rozpoczęte już w fazie przedszpitalnej u 1/3 osób ze STEMI i u co 10. chorego z NSTEMI. Prawie u wszystkich pacjentów ze STEMI i u znacznej większości z NSTEMI/UA przeprowadzono przezskórną interwencję wieńcową (96,2% i 73,8%). Pomostowanie aortalno-wieńcowe wykonano tylko u 2,5% chorych z NSTEMI i u żadnego pacjenta ze STEMI. Początkowo w ramach terapii przeciwplatekowej wykorzystywano: ASA + klopidogrel, a następnie stosowano połączenie leków: ASA + klopidogrel + inhibitor GPIIb/IIIa. Inne połączenia leków i preparaty przeciwplatekowe nowszej generacji stosowano jedynie w wyjątkowych przypadkach. Prawie 10% chorych z NSTEMI/UA nie otrzymało podwójnej terapii przeciwplatekowej przy wypisaniu ze szpitala. Angioplastyka wieńcowa odgrywała dominującą rolę w leczeniu pacjentów z ACS włączonych do polskiego rejestru EPICOR.

**Słowa kluczowe:** ostry zespół wieńcowy, rejestr, EPICOR

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## Adres do korespondencji:

dr n. med. Izabela Wojtkowska, Klinika Intensywnej Terapii Kardiologicznej, Instytut Kardiologii, ul. Alpejska 42, 04–628 Warszawa, e-mail: Izabelawojt@op.pl

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