In-Hospital and 12-Month Outcomes After Acute Coronary Syndrome Treatment in Patients Aged <40 Years of Age (from the Polish Registry of Acute Coronary Syndromes)

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We aimed to compare the characteristics and in-hospital and 12-month outcomes in patients aged >40 and <40 years with acute coronary syndrome. The analysis involved 789 patients aged <40 years and 63,057 patients aged ≥40 years enrolled in the ongoing Polish Registry of Acute Coronary Syndromes from October 2003 to December 2009. Patients aged <40 years with acute coronary syndrome differed from older patients in their clinical characteristics, treatment, and clinical outcome. The older patients more frequently had pulmonary edema (2.9% vs 0.4%, p <0.0001) and cardiogenic shock (4.7% vs 2.8%, p = 0.011) on admission. For the younger patients, coronary angiography and percutaneous coronary intervention were performed more often (71.5% vs 60.5%, p <0.0001 and 51.5% vs 47.7%, p = 0.04, respectively). The younger patients had a lower mortality rate than the older patients during hospitalization (1.5% vs 5.2%, p <0.0001) and during 12-month follow-up period (4.1% vs 13.4%, p <0.0001). Multivariate analysis revealed that age <40 years was one of the strongest factors associated with lower mortality during the 12 months after discharge (hazard ratio 0.42, 95% confidence interval 0.29 to 0.62, p <0.0001). In conclusion, younger patients had more favorable in-hospital and 1-year outcomes than older patients, and the age <40 years was revealed to be one of the strongest factors associated with lower mortality during the 1-year follow-up. **(Am J Cardiol 2014;114:175−180)**

There is a paucity of data concerning the clinical features, treatments, and outcomes of acute coronary syndrome (ACS) in young patients.[1,2] Published studies have been confined mainly to patients with acute myocardial infarction (AMI),[3−15] and many of them involved a limited number of patients.[3,5,8,11] The upper age limit across studies has ranged from 35 to 45 years,[1−15] and the outcomes were generally focused on in-hospital outcomes.[1,2,5,7,8,10,15] In our report, a cut-off point to define young patients was the age <40 years. Patients aged <40 years represent 2% to 6% of all patients with myocardial infarction (MI).[3,9] Patients with ACS are not synonymous with patients with AMI. Patients with ACS include those with ST elevation myocardial infarction (STEMI), non−ST elevation myocardial infarction (NSTEMI), and unstable angina (UA). Furthermore, published data concerning the characteristics, management, and outcomes of young patients have mostly come from clinical studies in specialized centers. Registries provide an opportunity to investigate, in a reliable manner, the treatment outcomes in patients encountered in general practice. The Polish Registry of Acute Coronary Syndrome (PL-ACS) was launched at the end of 2003 to obtain information about the epidemiology, treatment, and outcomes of patients with ACS in Poland.[16,17] The present study aimed to compare the characteristics, treatments, and in-hospital and 12-month outcomes of patients aged <40 and >40 years with ACS who were enrolled in the PL-ACS registry.

Methods

We used data from the PL-ACS registry. The design, method, and logistical aspects of the registry have been described previously.[16] The PL-ACS is an ongoing, nationwide, observational, multicenter study of consecutively hospitalized patients with ACS in Poland. The registry is a joint initiative of the Silesian Center for Heart Diseases in Zabrze and the Polish Ministry of Health. Logistic support is provided by the National Health Fund (NHF), the nationwide, obligatory public health insurance institution in Poland. The pilot phase of the PL-ACS registry commenced in October 2003 in Silesia, one of the 16 administrative regions in Poland with >4.8 million inhabitants. The study involved patients recruited in 46 Silesian hospitals. Since June 2005, all of the Polish administrative regions have collected data for the PL-ACS. Hospitals enrolling patients in the registry are required to have at least one of the following wards in their system: coronary care, cardiology, cardiac surgery, internal medicine, or an intensive care unit. The protocol was revised 2

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See page 180 for disclosure information.

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Table 1
Baseline demographic and clinical characteristics of the study groups

Variable	Age (Years) of Patients		p
	≥40 (n = 63,067)	<40 (n = 789)	
Age (years), mean ± SD	64.9 ± 11.1	34.6 ± 4.5	<0.0001
Women	24040 (38.1%)	127 (16.1%)	<0.0001
Previous MI	11308 (17.9%)	47 (5.9%)	<0.0001
Previous PCI	3420 (5.4%)	13 (1.7%)	<0.0001
Previous CABG	3446 (5.5%)	17 (2.2%)	<0.0001
Smoking	23625 (37.5%)	474 (60.1%)	<0.0001
Hypercholesterolemia	30154 (47.8%)	301 (38.2%)	<0.0001
Diabetes mellitus	15579 (24.7%)	43 (5.5%)	<0.0001
Obesity	12094 (19.2%)	128 (16.2%)	0.0361
Hypertension	44612 (70.7%)	335 (42.5%)	<0.0001
Clinical presentation			
Cardiac arrest before admission, no/no	1191/52118 (2.3%)	21/651 (3.2%)	0.11
Pulmonary edema	1850 (2.9%)	3 (0.4%)	<0.0001
Cardiogenic shock	2983 (4.7%)	22 (2.8%)	0.0105
STEMI	21940 (34.8%)	408 (51.7%)	<0.0001
NSTEMI	18173 (28.8%)	201 (25.5%)	0.04
Unstable angina	22954 (36.4%)	180 (22.8%)	<0.0001
Anterior wall infarct location, no/no	9013/22539 (39.9%)	177/411 (43.1%)	0.21
Inferior wall infarct location, no/no	11035/22539 (48.9%)	177/411 (43.1%)	0.0056
Sinus rhythm, no/no	38746/42560 (91.0%)	519/530 (97.9%)	<0.0001
Left ventricular ejection fraction, mean ± SD	48.2 ± 10.8*	51.3 ± 9.9†	0.0071

Hypercholesterolemia: a baseline cholesterol level greater than 200 mg/dl (5.2 mmol/L) and/or an LDL level greater than 130 mg/dl (3.4 mmol/L) or previously diagnosed and treated hypercholesterolemia; Obesity: a body mass-index (BMI) ≥30 kg/m^2; Hypertension: repeated systemic blood pressure measurements exceeding 140/90 mm Hg or treatment with antihypertensive drugs for a known diagnosis of hypertension.

* Data available for 39,011 patients.

† Data available for 518 patients.

times in subsequent years. In 2004, the data set was adapted to be compatible with the Cardiology Audit and Registration Data Standards.[18] However, the case report form (CRF) for the PL-ACS covers only part of the Cardiology Audit and Registration Data Standards data set. In 2005, new fields concerning angiography and percutaneous coronary intervention (PCI) procedures were added. The data were collected by skilled physicians who were in charge of each patient. The information was entered directly into an electronic CRF or temporarily printed onto a CRF before being transferred to an electronic CRF. All the data were encoded and sent to the NHF once a month. After verification of the information, the NHF transferred the data to the central database in the Silesian Center for Heart Diseases in Zabrze, where further checks were performed. Follow-up data regarding the rates for all-cause mortality, rehospitalization, recurrent ACS, and subsequent revascularization were obtained from the NHF data. The vital status and follow-up data at 12 months after ACS were available for all enrolled patients.

Consecutive patients with a confirmed diagnosis of ACS who were hospitalized in the Silesia region were enrolled. The definitions for the initial diagnosis of STEMI, NSTEMI, and UA were as follows:

- STEMI: the presence of (1) typical anginal pain and/or ischemic symptoms at rest lasting >20 minutes, (2) ST-segment elevation consistent with MI of ≥2 mm in adjacent chest leads and/or ST-segment elevation of ≥1 mm in ≥2 standard leads or new left bundle branch block, and (3) positive markers for cardiac necrosis.
- NSTEMI: (1) the absence of ST-segment elevation as defined previously and (2) positive markers for cardiac necrosis.
- UA: (1) the absence of ST-segment elevation as defined previously, (2) negative markers for cardiac necrosis, and (3) the presence of angina pectoris (or an equivalent type of ischemic discomfort) with any one of the 3 following features: (a) angina occurring at rest or for a prolonged period (usually >20 minutes), (b) new-onset angina of at least class III severity according the severity scale devised by the Canadian Cardiovascular Society, or (c) a recent acceleration of angina reflected by an increase in severity of at least 1 Canadian Cardiovascular Society class to at least Canadian Cardiovascular Society class III.

Hypertension was defined as repeated systemic blood pressure measurements exceeding 140/90 mm Hg or treatment with antihypertensive drugs for a known diagnosis of hypertension. Diabetes mellitus was diagnosed by fasting plasma glucose level >125 mg/dl (7.0 mmol/L), a random plasma glucose level of >200 mg/dl (11.1 mmol/L), or a history of diabetes mellitus, including those treated with diet, oral medications, or insulin. Hypercholesterolemia was defined as a baseline cholesterol level of >200 mg/dl (5.2 mmol/L) and/or a low-density lipoprotein cholesterol