SHORT COMMUNICATION

Long-term effects of the Managed Care After Acute Myocardial Infarction program: an update on a complete 1-year follow-up

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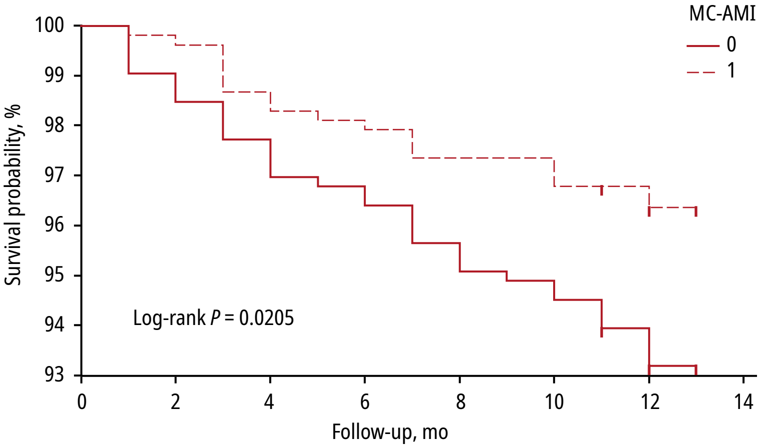
Introduction The rationale behind the Polish National Health Fund's initiative, the Managed Care after Acute Myocardial Infarction (MC-AMI) program, was to compensate the gap between high-quality in-hospital management of acute myocardial infarction (AMI) and lack of adequate postdischarge care, including insufficient access to cardiac rehabilitation (CR).[1] The design of the program included both the state-of-art in-hospital conservative and invasive management of AMI with primary percutaneous coronary interventions, as well as postdischarge CR, prevention of sudden cardiac death, and meticulous outpatient clinical visits throughout 1 year after index hospitalization.[1] The program was based on the concept that postdischarge care with CR represents a major component affecting long-term prognosis,[2] which is irrespective of the established in-hospital determinants of long-term outcome.[3] Recent data highlighted that CR after AMI may decrease the risk of hospital readmission,[4] especially if properly adjusted to the individual functional capacity of patients.[5] Also, appropriate education of patients after AMI may lead to significantly lower mortality during the 5-year follow-up.[6] Previous studies performed at our institution demonstrated that enrollment in the MC-AMI program was indeed associated with significantly reduced rate of major adverse cardiovascular events both at 3 months[7] and at median follow-up of 8 months.[8] Still, the latter report failed to show statistically significant benefit in terms of mortality reduction.[8] The purpose of the current report is to provide updated data on the long-term outcomes of patients enrolled in the MC-AMI program (KOS-Zawał) in comparison with the standard approach in a complete 12-month follow-up.

Methods The current study is an update on a complete follow-up of consecutive patients with AMI enrolled in the MC-AMI program in Upper Silesia Medical Center between 2017 and 2018 who were matched with a representative control group including patients with AMI treated in the year preceding the initiation of the program. We included all patients with AMI (both ST-segment elevation myocardial infarction and non–ST-segment elevation myocardial infarction) diagnosed in line with the third universal definition of myocardial infarction[9] who gave consent to participate in MC-AMI. All patients gave their separate written informed consent to participate in the study. The study was approved by the Ethics Committee of Medical University of Silesia and complied with the Declaration of Helsinki guidelines.

A detailed description of the interventions included in the MC-AMI program was provided in previous reports.[7-8] In brief, the program ensured staged systematic care of patients with



Patients at risk, n

Group 0	529	521	513	510	503	500	26	0
Group 1	529	527	520	518	515	512	17	0

FIGURE 1 A Kaplan-Meier survival curve for mortality depending on the enrollment in the Managed Care After Acute Myocardial Infarction (MC-AMI) program

AMI, including guidelines-driven in-hospital pharmacotherapy and invasive management (stage 1), postdischarge CR started approximately 1 week after the index hospitalization (stage 2), primary prevention of sudden cardiac death at 6 weeks following discharge (stage 3), and systematic outpatient follow-up visits during 12 months.[7,8] The principles of CR and follow-up were highlighted in previous papers.[7,8]

Data on clinical outcomes during 12 months were acquired from the database of the Polish National Health Fund. The composite endpoint of major adverse cardiovascular events (MACEs) comprised hospitalization due to worsening heart failure, recurrent AMI, and all-cause death, while the composite endpoint of major adverse cardiovascular and cerebrovascular events (MACCEs) additionally covered ischemic stroke.

Statistical analysis Statistical analysis was performed using the SPSS version 25.0 software (IBM Corp, Armonk, New York, United States). The study and control groups were matched using the propensity score method with the nearest neighbor algorithm (1:1). The model incorporated age, sex, arterial hypertension, dyslipidemia, diabetes mellitus, smoking, chronic kidney disease, ischemic stroke, type of AMI, presence of multivessel coronary artery disease (CAD), and left ventricular ejection fraction (LVEF). The clinical endpoints were compared using the χ^2 test with calculation of relative risk (RR) with 95% CI and number needed to treat (NNT). Additionally, the Kaplan-Meier survival curves were plotted for composite and individual endpoints and the log-rank test was applied. The Cox proportions hazards model was constructed in order to identify independent predictors of MACE in 12 months.

Results and discussion Detailed demographic and clinical characteristics of the study population were described in previous studies.[7-8] In brief, out of initial 2341 patients,[7-8] the final population included 529 patients enrolled in the MC-AMI program who were matched with 529 patients in the control group using the propensity score. Patients in both groups represented a typical CAD population with the predominance of men (n = 717 [67.8%]), with the mean (SD) age of 66.37 (10.94) years and cardiovascular risk factors (arterial hypertension, 852 [80.5%]; smoking, 443 [41.9%]; diabetes mellitus, 339 [32%]).[7-8]

Overall, MACCEs were reported in 168 patients (15.9%) and death occurred in 55 patients (5.2%). Patients enrolled in the MC-AMI program had significantly lower rate of combined endpoint MACE (11.3% vs 19.1%; RR, 0.594; NNT, 12.9; $P = 0.0006$; log-rank $P = 0.0005$). Of note, the MC-AMI group had lower mortality (3.6% vs 6.8%; RR, 0.528; NNT, 31.1; $P = 0.021$; log-rank $P = 0.0205$; see FIGURE 1), recurrent myocardial infarction (4% vs 6.8%; RR, 0.583, NNT, 35.3; $P = 0.044$; log-rank $P = 0.0379$), and comparable rate of hospitalizations due to worsening of heart failure (5.1% vs 7.2%; RR, 0.711; $P = 0.1615$; log-rank $P = 0.1473$). The MC-AMI group was also characterized by a lower rate of stroke (0.2% vs 1.5%; RR, 0.125; NNT, 75.6; $P = 0.0496$) and lower risk of MACCEs (11.3% vs 20.4%; RR, 0.556; NNT, 11; $P = 0.0001$).

The Cox proportional hazards model indicated that MACE was associated with MC-AMI (hazard ratio [HR], 0.529; $P < 0.001$), LVEF (HR, 0.964 per 1%; $P < 0.001$), age (HR, 1.024; $P = 0.003$), diabetes mellitus (HR, 1.489; $P = 0.014$), preexisting hyperlipidemia (HR, 0.617; $P = 0.004$), peripheral artery disease (HR, 1.559; $P = 0.037$), history of unstable angina (HR, 2.202; $P = 0.001$), and episode of atrial fibrillation in the course of myocardial infarction (HR, 1.522; $P = 0.043$).

These findings mostly validate our former results from 3-month[7] and 8-month follow-up,[8] which showed spectacular clinical benefit of the MC-AMI participation reflected by a significantly lower rate of MACCEs and strokes during a median follow-up of 8 months.[8] In the present study, we present evidence that inclusion in the MC-AMI program leads not only to the reduction of composite endpoint, but also is related with a significantly lower risk of recurrent AMI and 1-year mortality, in contrast to a previous paper with incomplete follow-up.[8] Our results should be compared with a meta-analysis by Anderson et al,[2] who found reduction of cardiovascular (RR, 0.74; 95% CI, 0.64–0.86), but not overall mortality (RR, 0.96; 95% CI, 0.88–1.04) in patients with CAD qualified for exercise-based rehabilitation.[2] However, this meta-analysis covered only

CR regimen without meticulous follow-up as described in the MC-AMI program,[7-8] which might lead to the reduction of noncardiovascular component of mortality. Unfortunately, cardiovascular and noncardiovascular mortality was not distinguished in our trial. This survival benefit is probably conditioned by an improved cardiac function in patients submitted to CR, reflected by lower resting heart rate, higher LVEF, greater peak VO_2, lower left ventricular end-diastolic volume and wall motion score index.[10] In addition, the cardiovascular education during and after CR may also contribute to improved prognosis, as shown in a large Swedish cohort of post-AMI patients.[6] Our data further supports the crucial role of systematic approach to postdischarge care of patients presenting with myocardial infarction[11] with all its vital components. Our study demonstrates that a centrally-driven and well-designed healthcare policy may have a real and substantial impact on the improvement of prognosis in a relatively short period.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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