Management of patients with myocardial infarction complicated by cardiogenic shock: Data from a comprehensive all-comer administrative database covering a population of 4.4 million

Mariusz Gąsior[1], Mateusz Tajstra[1], Daniel Cieśla[2], Tomasz Hrapkowicz[3], Klaudiusz Nadolny[4], Krystian Wita[5], Grzegorz Smolka[6, 7], Krzysztof Milewski[8], Wojciech Wojakowski[9], Katarzyna Mizia-Stec[7, 10], Zbigniew Kalarus[11], Przemysław Trzeciak[1]

[1]3rd Department of Cardiology, Faculty of Medical Sciences in Zabrze, Medical University of Silesia in Katowice, Silesian Center for Heart Diseases, Zabrze, Poland
[2]Department of Science and New Technologies, Silesian Centre for Heart Diseases, Zabrze, Poland
[3]Department of Cardiac Surgery, Transplantology, Vascular and Endovascular Surgery, Faculty of Medical Sciences in Zabrze, Medical University of Silesia, Silesian Center for Heart Diseases, Zabrze, Poland
[4]Department of Emergency Medical Service, Faculty of Medicine, Silesian Academy in Katowice, Katowice, Poland
[5]1st Department of Cardiology, School of Medicine in Katowice, Medical University of Silesia, Katowice, Poland
[6]Department of Cardiology, Faculty of Health Science, Medical University of Silesia, Katowice, Poland
[7]Upper-Silesian Medical Centre, Katowice, Poland
[8]Cardiology and Cardiac Surgery Center in Bielsko-Biala, American Heart of Poland, Bielsko-Biała, Poland
[9]Division of Cardiology and Structural Heart Diseases, Medical University of Silesia, Katowice, Poland
[10]1st Department of Cardiology, School of Medicine in Katowice, Medical University of Silesia, Katowice, Poland
[11]Department of Cardiology, Congenital Heart Diseases and Electrotherapy, Faculty of Medical Sciences in Zabrze, Medical University of Silesia, Katowice, Silesian Center for Heart Diseases in Zabrze, Zabrze, Poland

Correspondence to:
Mateusz Tajstra, MD, PhD,
3rd Department of Cardiology,
Faculty of Medical Sciences in Zabrze,
Medical University of Silesia in Katowice,
Silesian Center for Heart Diseases,
Curie-Skłodowskiej 9, 41–800 Zabrze, Poland,
phone: +48 32 373 36 19,
e-mail: mateusztajstra@wp.pl

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INTRODUCTION

Cardiogenic shock (CS) is characterized by heterogeneity of etiology, clinical presentation, management, and poor prognosis. Notwithstanding advanced treatment strategies, CS in the course of myocardial infarction (MI) has an extremely high mortality rate [1, 2]. There is an ongoing discussion on how to improve the results of treatment in this population. Furthermore, data concerning management and treatment outcomes for these patients mostly come from clinical trials performed in highly specialized centers and selected groups of patients. There is a paucity of comprehensive all-comer data concerning the treatment strategy for the population of patients with MI complicated by CS (MI-CS). This analysis aimed to present the current management and in-hospital mortality of patients hospitalized with the diagnosis of MI-CS and enrolled in the SILCARD database.

METHODS

General information on the SILCARD database (ClinicalTrials.gov identifier, NCT02743533) and all presented data including mortality were described previously [3]. In brief, the database contains records from all hospitals (n = 310) in the Silesian Province — a highly industrialized region in Poland with a population of 4.4 million (11.6% of Poland's total population). The Silesian Province provides a well-developed hospital network with two tertiary cardiology hospitals, three cardiac surgery departments, and 20 catheterization laboratories. The only healthcare provider in Poland — the National Health Fund — supplied all data to the database.

The analysis included all patients from the SILCARD database hospitalized with a principal diagnosis of shock (R57 code according to ICD-10) between 2006 and 2021. Figure 1 presents the logistics, management, and in-hospital mortality in patients with cardioge-

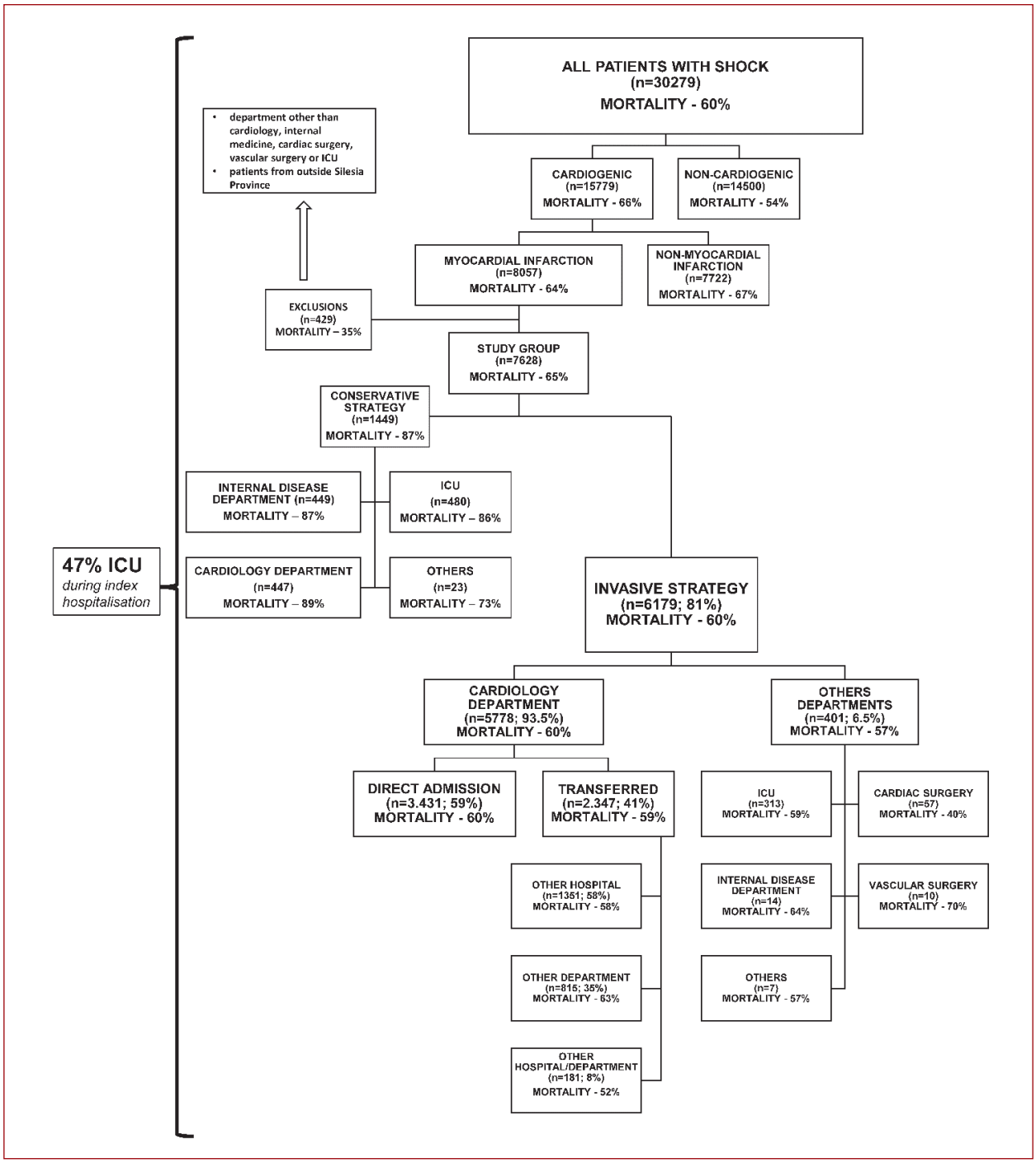

Figure 1. Logistics, management, and in-hospital mortality in patients with shock diagnosis

Abbreviations: AF, atrial fibrillation; AS, aortic stenosis; ICU, intensive care unit

nic shock diagnosis. The definition of invasive management was based on the usage of invasive coronary angiography.

Statistical analysis

The normality of the distribution was verified using the Shapiro–Wilk test. Continuous variables were expressed as means with standard deviations (SD) and compared with Student's t-test. Categorical variables were compared with the χ^2 test, and also with the Yates correction. For all analyses, a 2-tailed *P*-value <0.05 was considered significant. TIBCO Software Inc. (2017) Statistica (data analysis software system), version 13.3 was used for all calculations.

RESULTS

Figure 1 shows the patient flowchart. Among 30279 patients hospitalized with a diagnosis of shock, in 52.1% (n = 15 779) of cases, the shock was cardiogenic, including 8057 patients with MI-related CS. Patients with MI-CS, compared to those with non-MI-related CS, did not significantly differ in mean age (70.0 [11.4] vs. 70.0 [13.6];

$P = 0.84$), length of hospitalization (7 [2–16] vs. 7 [2–17] days; $P = 0.42$), and incidence of diabetes mellitus (34.0% vs. 35.1%; $P = 0.13$), but they were less often females (41.4% vs. 44.5%; $P < 0.001$), and had lower incidence of hypertension (69.3% vs. 72.3%; $P < 0.001$) and atrial fibrillation (10.5% vs. 23.3%; $P < 0.001$). The majority (81%) of MI-CS patients were treated invasively.

Patients treated conservatively, compared to those treated invasively were older (74.4 [10.9] vs. 69.2 [11.2]; $P < 0.001$), had a higher incidence of a previous diagnosis of heart failure (38.9% vs. 31.6%; $P < 0.001$), and the proportion of female patients (50% vs. 39.9%; $P < 0.001$). In the group of patients treated invasively, 86% had percutaneous coronary angioplasty, 3.2% had surgical revascularization, and in 10.8% no revascularization procedure was performed. In-hospital mortality in these subgroups was 59.0%, 43.2%, and 70.7%, respectively.

The in-hospital mortality rates in patients with non-MI-CS treated in the years 2006–2007 and 2020––2021 were comparable, from 69.9% to 68.2%, ($P = 0.49$). In MI-CS patients in the same years, in-hospital mortality decreased from 67.7% to 59.7%, ($P < 0.001$). MI-CS patients managed conservatively exhibited a notably high in-hospital mortality rate of 87%.

Within the entire study population, 47% of patients were treated in the intensive care unit during index hospitalization.

DISCUSSION

The population of patients with shock exhibited significant variability. While the majority of clinical research has been focused on the MI-CS population, in recent years, there has been a noticeable increase in the number of patients with non-MI-CS, particularly those suffering from severe chronic heart failure [4, 5]. Both the MI-CS and non-MI--CS populations in our analysis exhibited high in-hospital mortality rates.

Data from the United States, including a cohort of 1 254 358 CS patients, showed a decrease in in-hospital mortality rates. Among MI-CS patients, the mortality rate decreased from 44% in 2004 to 35% in 2018. Similarly, for non-MI-CS patients, the mortality rate decreased from 53% in 2004 to 36% in 2018 [4].

In the analysis of 441 696 patients with CS treated in German hospitals between 2005 and 2017, at a mean age of 70.97 (13.75), the in-hospital mortality rate remained around 60%. Notably, there was no significant decline in in-hospital mortality among patients with non-MI CS during this period, while a slight decrease was observed in those with MI-CS [5].

Our analysis has great significance from a systemic perspective, particularly regarding logistic management in this cohort of patients. It confirmed extremely high in-hospital mortality in the group of patients treated conservatively.

Although over 80% of patients underwent coronary angiography and nearly 60% were promptly transported to one of the 20 nearest catheter laboratories, in-hospital survival did not meet expectations. It is worth mentioning that in the relatively small subgroup of patients who underwent coronary artery bypass grafting, the mortality rate was the lowest. Despite the current usage of percutaneous angioplasty as the primary treatment, the role of surgical revascularization appears to be underappreciated. The vast majority of patients were treated in local hospitals with catheter laboratories that lacked a cardiac surgery department and advanced mechanical circulatory support techniques.

Given the high mortality rates, MI-CS patients should ideally be managed by specialized Cardiac Shock Teams within dedicated Cardiac Shock Centers. These centers should provide the highest level of specialized care, ensuring not only access to a catheterization laboratory but also cardiothoracic surgery and advanced mechanical circulatory support techniques [6–8].

Article information

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