National Cardiogenic Shock Treatment Program in Poland

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INTRODUCTION

Cardiogenic shock (CS) is a complex clinical syndrome that, despite advances in pharmacological and interventional treatments and availability of mechanical circulatory support (MCS), remains associated with alarmingly high in-hospital mortality above 60% in Poland. By contrast, in the US, mortality rates have gradually declined to 35% [1, 2]. The reduction of mortality in the US can be attributed to the implementation of a system involving highly specialized central HUBs and satellite centers (SPOKEs), which quickly transfer patients to the HUB if no clinical improvement is achieved. At the HUB, a dedicated multidisciplinary team, referred to as the SHOCK TEAM, provides comprehensive and coordinated care for patients in CS. Recognizing the poor treatment outcomes in Poland and inspired by the success of the first SHOCK TEAM in Poland at the Wroclaw University Hospital [3], the Polish Cardiac Society proposes the implementation of a National Cardiogenic Shock Treatment Program across the country. This program is designed to adapt best practices from leading global centers for Poland's healthcare system.

METHODS

The primary objective of the program is to reduce in-hospital mortality due to CS in Poland. Specific goals include organizing a nationwide CS treatment network supported by a communication and notification system based on a mobile application. The Polish Cardiac Society has established a Committee for the National Cardiogenic Shock Treatment Program, tasked with introducing modern treatment methods for CS into clinical practice, thereby optimizing both management and treatment efficiency (Figure 1A).

The proposed system will involve a hierarchical hospital network classified into three levels: basic (SPOKE), advanced (HUB), and highly specialized (SUPERHUB) (Figure 1B). In Poland, based on the existing healthcare infrastructure, there are 140 SPOKEs, 23 HUBs, and 7 SUPERHUBs (Figure 1C). Each center will have its SHOCK TEAM composed of medical professionals dedicated to treating CS. Depending on the center's level of specialization, the team composition may vary: (A) SPOKE: An invasive cardiologist, general cardiologist, and optionally an intensivist; (B) HUB: An invasive cardiologist, intensive care cardiologist,

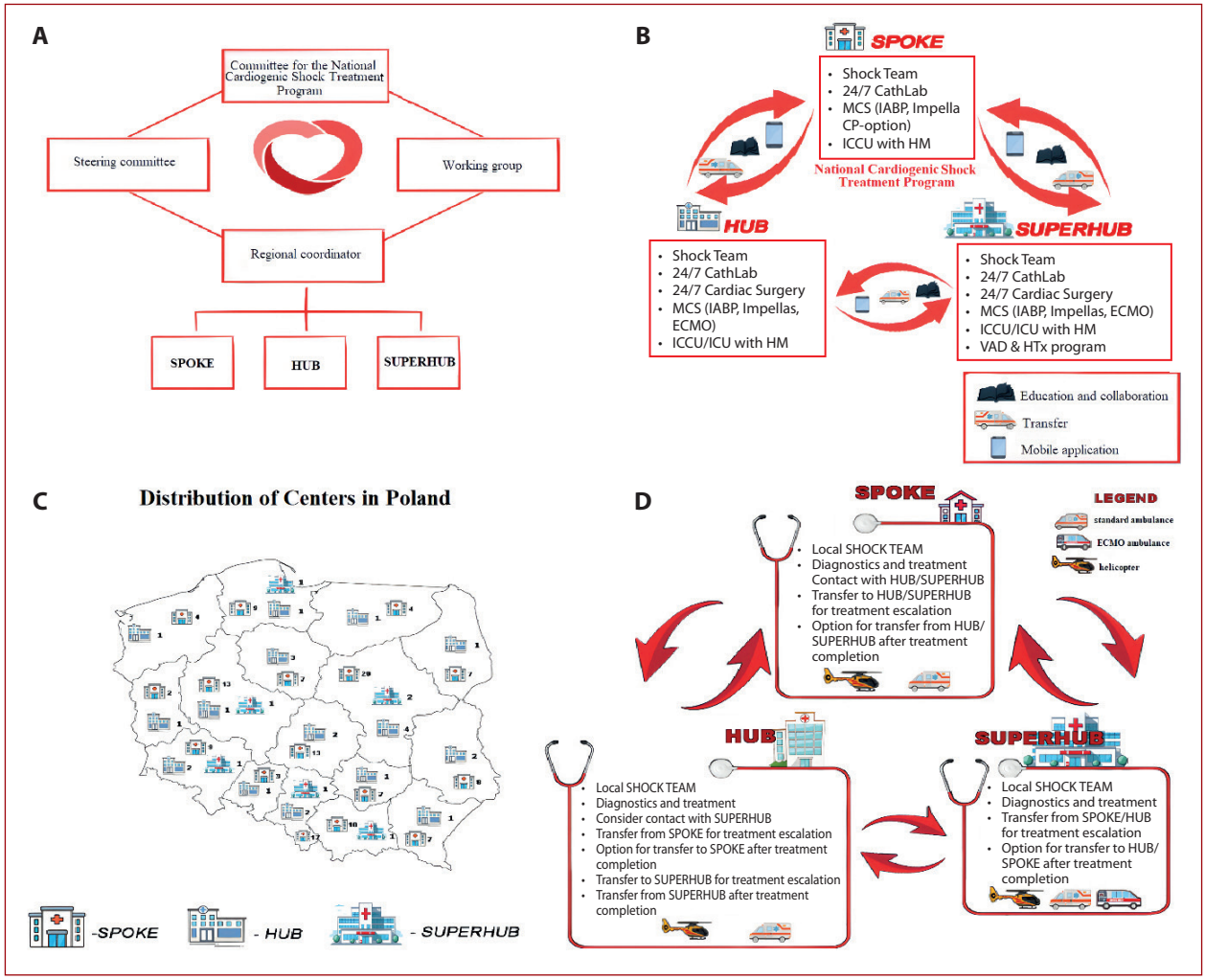

Figure 1. A. Design of the National Cardiogenic Shock Treatment Program. **B.** SPOKE and HUB system. **C.** Distribution of the Centers in Poland. **D.** Collaboration Network between SPOKES and HUBs

Abbreviations: ECMO, extra corporeal membrane oxygenation; HM, hemodynamic monitoring (e.g. pulmonary artery catheter or other); HTx, heart transplantation; ICCU, intensive cardiac care unit; ICU, intensive care unit; Impellas, include Impella CP, Impella 5.5, Impella RP; MCS, mechanical circulatory support; VAD, ventricular assist device

intensive care specialist, and a cardiac surgeon, (C) SUPERHUB: An invasive cardiologist, intensive care cardiologist, intensive care specialist, cardiac surgeon, transplantologist. Three primary clinical scenarios are anticipated, depending on where a patient initially presents with CS: (1) At the SPOKE level: The local SHOCK TEAM diagnoses and treats the patient and consults a HUB or SUPERHUB for patients resistant to initial treatment, possibly leading to patient transfer, (2) At the HUB level: The local SHOCK TEAM treats the patient and consults the SUPERHUB for further management or transfer in cases of refractory shock, (3) At the SUPERHUB level: The local SHOCK TEAM handles patient diagnosis and treatment (Figure 1D). Inclusion criteria include the following: (a) initial diagnosis of CS etiology, (b) fulfillment of the definition of CS: systolic blood pressure <90 mm Hg for >30 minutes or vasopressor use to maintain ≥90 mm Hg with normal volume status, clinical signs of organ hypoperfusion: urine output <30 ml/hour, cold extremities, altered mental status, elevated lactate levels >2.0 mmol/l, mean pulmonary capillary wedge pressure or *left ventricular end diastolic pressure* >15 mm Hg, CI ≤2.2 l/min/m^2 (optional for SPOKE), (c) CS classified as Society for Cardiovascular Angiography and Interventions (SCAI) stage C–E, (d) diagnosis of CS within 24 hours. Exclusion criteria include the following: (a) post-cardiac arrest with suspected irreversible anoxic brain damage, (b) irreversible multi-organ failure, (c) terminal stages of chronic diseases other than heart failure, (d) known malignancy with poor 1-year survival.

The program includes the development of protocols standardizing diagnostic and treatment management as follows: the classification of CS according to the SCAI scale, management of MCS therapy, echocardiographic assessment, recognition of futile therapy, qualification for organ donation, as well as dedicated protocols for SPOKE, HUB, and SUPERHUB centers defining the method of transferring patients between centers, including patients undergoing MCS therapy. Additionally, a regional coordinator will be

appointed in each province to oversee proper collaboration among all centers within the National Cardiogenic Shock Treatment Program network.

DISCUSSION

Experience from the US has shown that both the HUB-SPOKE system and the presence of SHOCK TEAMS significantly reduce in-hospital mortality for this patient group. Introducing a similar, multi-level multidisciplinary care system in Poland could be critical in improving outcomes for CS patients [4–6]. Furthermore, the Shock Team strategy is recommended by the latest expert consensus of the Polish Cardiac Society [7]. In Poland, a similar system has only been implemented in Lower Silesia, where the University Hospital in Wroclaw established a SHOCK TEAM in 2021, collaborating with cardiology departments in the region. This system has led to a significant reduction in in-hospital mortality from 75.4% in 2021 to 44.1% in 2023. This improvement was achieved through the increased use of MCS (both short-term and long-term) and a rise in heart transplants [3]. Data on CS mortality in Poland are limited; however, findings from the Impella-PL registry indicate poor outcomes in CS patients treated with the Impella device, showing a high in-hospital mortality rate of 76.4%. [8] According to the data from Gąsior et al. [1], in-hospital mortality in CS reported in Upper Silesia is 60%. Lowering it to 40% after implementation of the program and extrapolating it to the whole country we could save approximately 2500 lives annually. The primary anticipated barrier to the implementation of this program is the organization and coordination of the local SPOKE and HUB networks, ensuring efficient patient referral flow to HUBs and SUPERHUBs.

Another anticipated benefit of the program is the optimization of resource allocation, including personnel and equipment, within HUBs and SUPERHUBs. Larger clinical centers, which offer specialized care in areas such as, cardiac surgery, vascular surgery and nephrology, are better equipped to manage complications often seen in CS. Moreover, it is well-documented that larger centers with more experience in invasive diagnostics and revascularization techniques, and MCS use have lower complication rates due to their steeper learning curves. Cost-effectiveness is another potential advantage of the proposed program. More frequent and efficient use of specialized equipment by experienced staff will reduce the per-procedure cost, benefiting both payers and providers. The success of the program will depend in part on the number of patients treated and the program's organizational efficiency. Positive outcomes may become evident within 2–3 years of implementation [5, 9].

CONCLUSION

The National Cardiogenic Shock Treatment Program is an initiative that has the potential to significantly improve the prognosis for patients experiencing this severe cardiovascular complication. The creation of a comprehensive CS care system in Poland presents a significant challenge, but we believe that the pilot phase of the program, planned in selected regions, will provide the necessary data and analysis to optimize its nationwide implementation.

Article information

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