

Reducing Sex Disparities in STEMI Care and Outcomes: Turning the Tide for Women

F. Aaysha Cader¹  and Cristina Gavina^{2,3} 

Departamento de Cardiologia - Ibrahim Cardiac Hospital & Research Institute,¹ Dhaka – Bangladesh

Departamento de Cardiologia e Medicina - Hospital Pedro Hispano,² ULS Matosinhos – Portugal

Universidade do Porto,³ Porto – Portugal

Short Editorial related to the article: ST-Segment Elevation Myocardial Infarction Differences between Genders – A Single Center Retrospective Analysis

Despite improvements in acute coronary syndromes (ACS) care, globally, sex disparities remain.¹ Women with ST-segment elevation myocardial infarction (STEMI) present later, receive suboptimal care, and have worse outcomes than men.¹⁻³

In a single-center retrospective analysis of 809 STEMI patients undergoing primary PCI in Braga, Portugal, Oliveira et al. reported sex disparities in presentation, management, and outcomes.⁴ Although ischemic heart disease and coronary death incidence are lower in Portugal than in other European countries,⁵ cardiovascular death remains the main cause of mortality.

Similar to global trends, in this study, women were older, with a greater prevalence of co-morbidities, including diabetes, hypertension, chronic kidney disease, and acute ischemic stroke, and a higher GRACE risk score.⁴ Women presented more frequently with “atypical symptoms,” worse Killip class, cardiogenic shock, and required hemodynamic support. They also experienced delayed reperfusion and were less likely to receive guideline-directed medical therapy.⁴ Women had greater in-hospital, short and long-term mortality at 1 year, compared to men, although the female sex was not an independent prognostic factor for mortality. Worse outcomes were seen with increasing age, although a sex-specific analysis of outcomes by age was not reported.⁴

These sex disparities reflect global registries and the large Portuguese Registry of Acute Coronary Syndromes (ProACS), including 49,113 ACS patients, 14,177 of whom were women.⁶ In addition to the outcomes above, this registry also reported a higher incidence of major bleeding and atrial fibrillation.

Prompt revascularization is of paramount importance for improved outcomes in STEMI. In this study, significantly greater delays were seen in all parameters for women after they had presented for medical care, including first medical

contact (FMC)-to-electrocardiogram, symptom onset-to-balloon, and FMC-to-balloon.⁴ Notably, no differences were seen in time from symptom onset to FMC, despite women reporting more “atypical” symptoms. This potentially indicates implicit biases in healthcare, and an under-recognition of symptoms, likely resulting in less aggressive treatment of women.⁷

Indeed, contemporary literature demonstrates that symptoms in women are often more similar to men,^{8,9} with approximately 90% of women and men with a myocardial infarction (MI) reporting chest pain as the presenting symptom.¹⁰ In the present study, women reported more “atypical” symptoms of epigastric pain, nausea, and dyspnea.⁴ Recognition of sex differences in symptoms of ACS is paramount, as women often report three or more accompanying symptoms along with chest discomfort.¹⁰ Terminology such as “atypical chest pain” lends itself to less emergent care in women and is thus no longer recommended as a word to describe chest pain by the 2021 Chest Pain Guidelines from the American Heart Association and the American College of Cardiology.¹¹

Women undergoing primary PCI frequently experience more major bleeding, with reperfusion strategies less frequently involving thrombo-aspiration and transradial access,¹² which is known to reduce bleeding and improve mortality in ACS. This aspect, as well as additional procedural variables such as plaque composition on intravascular imaging, proportions of myocardial infarction with non-obstructive coronary arteries (MINOCA) or spontaneous coronary artery dissection (SCAD),^{13,14} both of which are more prevalent STEMI presentations in women, were not reported in this analysis.

The success of primary PCI hinges on the degree of thrombus burden in the occluded vessel and its downstream distal embolization, leading to slow flow or no-reflow.¹⁵ A recent meta-analysis of three randomized trials found that among STEMI patients with the high-thrombus burden (HTB), women had more risk for stent thrombosis and cardiovascular and all-cause mortality than men.¹⁵ Although HTB was not captured in this study, women were significantly more likely to have a pre-PCI TIMI flow grade of 0 and increased slow flow/no-reflow.⁴ Despite this, unfractionated heparin use was significantly less prevalent in women than in men (85.4% vs. 90.0%).

Although sex was not found to be an independent predictor of mortality after adjustment for covariates, the disparities in care across the board prompt a louder call for action in STEMI and, indeed, ACS care of women.

Keywords

ST Elevation Myocardial Infarction; Sex Disparities; Women; Acute Coronary Syndromes.

Mailing Address: F. Aaysha Cader •

Ibrahim Cardiac Hospital & Research Institute, Dhaka – Cardiology – 122, Kazi Nazrul Islam Avenue, Shahbag, Dhaka Please Select 1000 – Bangladesh
E-mail: aaysha.cader@gmail.com

DOI: <https://doi.org/10.36660/abc.20220884>

How do we turn the tide? Globally, implicit biases in healthcare exist, resulting in underdiagnosis and delayed treatment of women with STEMI. Appropriate public health messaging to ensure timely presentation at hospitals² and education and bias mitigation training of healthcare personnel are of paramount importance, as is appropriate attention to recognizing accompanying symptoms of chest pain.¹

Protocol-driven, systems-based approaches to STEMI care have demonstrated reduced sex disparities in

STEMI care and improved outcomes in women² and should be incorporated into practice. Female participant representation in clinical trials must be enhanced. Regional disparities in perceptions and practice exist; therefore, region and country-specific research is needed, leveraging large-scale registries to identify gaps in management and sex-specific predictors of STEMI outcomes to define better-targeted approaches to care best suited to each country's healthcare system.

References

1. Cader FA, Banerjee S, Gulati M. Sex Differences in Acute Coronary Syndromes: A Global Perspective. *J Cardiovasc Dev Dis.* 2022;9(8):239. doi: 10.3390/jcdd9080239.
2. Huded CP, Johnson M, Kravitz K, Menon V, Abdallah M, Gullett TC, et al. 4-Step Protocol for Disparities in STEMI Care and Outcomes in Women. *J Am Coll Cardiol.* 2018;71(19):2122-32. doi: 10.1016/j.jacc.2018.02.039.
3. Stehli J, Martin C, Brennan A, Dinh DT, Lefkovits J, Zaman S. Sex Differences Persist in Time to Presentation, Revascularization, and Mortality in Myocardial Infarction Treated With Percutaneous Coronary Intervention. *J Am Heart Assoc.* 2019;8(10):e012161. doi: 10.1161/JAHA.119.012161.
4. Oliveira CC, Vilela F, Braga C, Costa J, Marques J. ST-Segment Elevation Myocardial Infarction Differences between Genders – A Single Center Retrospective Analysis. *Arq Bras Cardiol.* 2023; 120(1):e20211040.
5. Timmis A, Vardas P, Townsend N, Torbica A, Katus H, Smedt D, et al. European Society of Cardiology: Cardiovascular Disease Statistics 2021. *Eur Heart J.* 2022;43(8):716-99. doi: 10.1093/eurheartj/ehab892.
6. Roque D, Ferreira J, Monteiro S, Costa M, Gil V; Portuguese National Registry of Acute Coronary Syndromes Investigators. Understanding a Woman's Heart: Lessons From 14 177 Women with Acute Coronary Syndrome. *Rev Port Cardiol.* 2020;39(2):57-72. doi: 10.1016/j.repc.2020.03.002.
7. Johansson I, Strömberg A, Swahn E. Factors Related to Delay Times in Patients with Suspected Acute Myocardial Infarction. *Heart Lung.* 2004;33(5):291-300. doi: 10.1016/j.hrtlng.2004.04.002.
8. Khan NA, Daskalopoulou SS, Karp I, Eisenberg MJ, Pelletier R, Tsadok MA, et al. Sex Differences in Acute Coronary Syndrome Symptom Presentation in Young Patients. *JAMA Intern Med.* 2013;173(20):1863-71. doi: 10.1001/jamainternmed.2013.10149.
9. Wouters LTCM, Zwart DLM, Erkelens DCA, Groot E, van Smeden M, Hoes AW, et al. Gender-Stratified Analyses of Symptoms Associated with Acute Coronary Syndrome in Telephone Triage: A Cross-Sectional Study. *BMJ Open.* 2021;11(6):e042406. doi: 10.1136/bmjopen-2020-042406.
10. Lichtman JH, Leifheit EC, Safdar B, Bao H, Krumholz HM, Lorenze NP, et al. Sex Differences in the Presentation and Perception of Symptoms Among Young Patients with Myocardial Infarction: Evidence from the VIRGO Study (Variation in Recovery: Role of Gender on Outcomes of Young AMI Patients). *Circulation.* 2018;137(8):781-90. doi: 10.1161/CIRCULATIONAHA.117.031650.
11. Gulati M, Levy PD, Mukherjee D, Amsterdam E, Bhatt DL, Birtcher KK, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation.* 2021;144(22):e368-e454. doi: 10.1161/CIR.0000000000001030.
12. Leurent G, Garlantézec R, Auffret V, Hacot JP, Coudert I, Filippi E, et al. Gender Differences in Presentation, Management and Inhospital Outcome in Patients with ST-Segment Elevation Myocardial Infarction: Data From 5000 Patients Included in the ORBI Prospective French Regional Registry. *Arch Cardiovasc Dis.* 2014;107(5):291-8. doi: 10.1016/j.acvd.2014.04.005.
13. Chieffo A, Buchanan GL, Mehilli J, Capodanno D, Kunadian V, Petronio AS, et al. Percutaneous Coronary and Structural Interventions in Women: A Position Statement From the EAPCI Women Committee. *EuroIntervention.* 2018;14(11):e1227-e1235. doi: 10.4244/EIJ-D-18-00225.
14. Kunadian V, Chieffo A, Camici PG, Berry C, Escaned J, Maas AHEM, et al. An EAPCI Expert Consensus Document on Ischaemia with Non-Obstructive Coronary Arteries in Collaboration with European Society of Cardiology Working Group on Coronary Pathophysiology & Microcirculation Endorsed by Coronary Vasomotor Disorders International Study Group. *Eur Heart J.* 2020;41(37):3504-20. doi: 10.1093/eurheartj/ehaa503.
15. Manzi MV, Buccheri S, Jolly SS, Zijlstra F, Frøbert O, Lagerqvist B, et al. Sex-Related Differences in Thrombus Burden in STEMI Patients Undergoing Primary Percutaneous Coronary Intervention. *JACC Cardiovasc Interv.* 2022;15(20):2066-76. doi: 10.1016/j.jcin.2022.08.013.

