

Risk Stratification in Heart Failure: The Role of the MAGGIC Score in a Brazilian Population

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Short Editorial related to the article: Performance of the MAGGIC Score in Individuals with Heart Failure: Validation in a Brazilian Population

Heart failure (HF) represents one of the main challenges in contemporary cardiology and is the leading cause of hospitalization for cardiovascular disease in Brazil, especially among older adults.¹ In addition to the high burden of morbidity and mortality, HF is associated with high rates of hospital readmission and a significant impact on healthcare systems.² Given this scenario, early identification of patients at higher risk of adverse events has become a fundamental component of the clinical management of the disease.

Risk stratification tools play a central role in this process, assisting in prognostic estimation, therapeutic planning, and shared clinical decision-making with patients and families.

Several prognostic models have been developed for this purpose, including the Seattle Heart Failure Model and PREDICT-HF.^{3,4} However, among the available scores, MAGGIC (Meta-Analysis Global Group in Chronic Heart Failure) stands out for its broad validation and clinical applicability.^{5,6}

Models developed in specific populations may exhibit different performance in other clinical settings, reinforcing the importance of external validation in different population contexts.⁷ In Brazil, despite the high burden of HF, studies evaluating the performance of prognostic models widely used in international practice are still scarce.

In this context, the study “Performance of the MAGGIC Score in Individuals with Heart Failure: Validation in a Brazilian Population,” makes a relevant contribution by evaluating the performance of the MAGGIC score in a

Brazilian cohort of patients followed in a specialized outpatient clinic for HF.⁸

In the study, the MAGGIC score showed good discriminative ability (AUC 0.72) and adequate calibration, results comparable to those observed in international validations. A particularly relevant aspect of the study was the stratified analysis by sex, which demonstrated similar model performance in men and women.

Consideration of sex-specific differences in HF has received increasing attention in the literature. Men and women exhibit important differences in epidemiology, etiology, cardiac remodeling, and response to treatment.⁹ Women, for example, have a higher prevalence of HF with preserved ejection fraction, while men have a higher frequency of ischemic etiology and systolic dysfunction.¹⁰ These differences can influence the performance of prognostic models, making the evaluation of their accuracy in both sexes particularly relevant.¹¹

Therefore, the findings of the present study reinforce prior evidence that the MAGGIC score performs consistently across sex. This result has relevant clinical implications, suggesting that the model can be safely applied to the prognostic stratification of men and women with HF in the Brazilian population.¹² Another interesting finding was the observation of discrepancies between predicted and observed mortality in some risk categories. There was a tendency towards underestimation of mortality in lower-risk groups and slight overestimation in high-risk patients. This phenomenon has already been described in other validations of the score and may reflect differences in the clinical characteristics of the populations evaluated or changes in therapeutic management over time⁸ (Figure 1).

In clinical practice, the MAGGIC score offers a significant advantage because it uses only widely available clinical and laboratory variables, making it suitable for application in different healthcare settings, including resource-limited environments, a reality still present in several regions of Brazil.

Despite the study’s contributions, some limitations should be considered. The analysis was conducted at a single tertiary center, which may limit the generalizability of the results. Furthermore, both the cohort analyzed and

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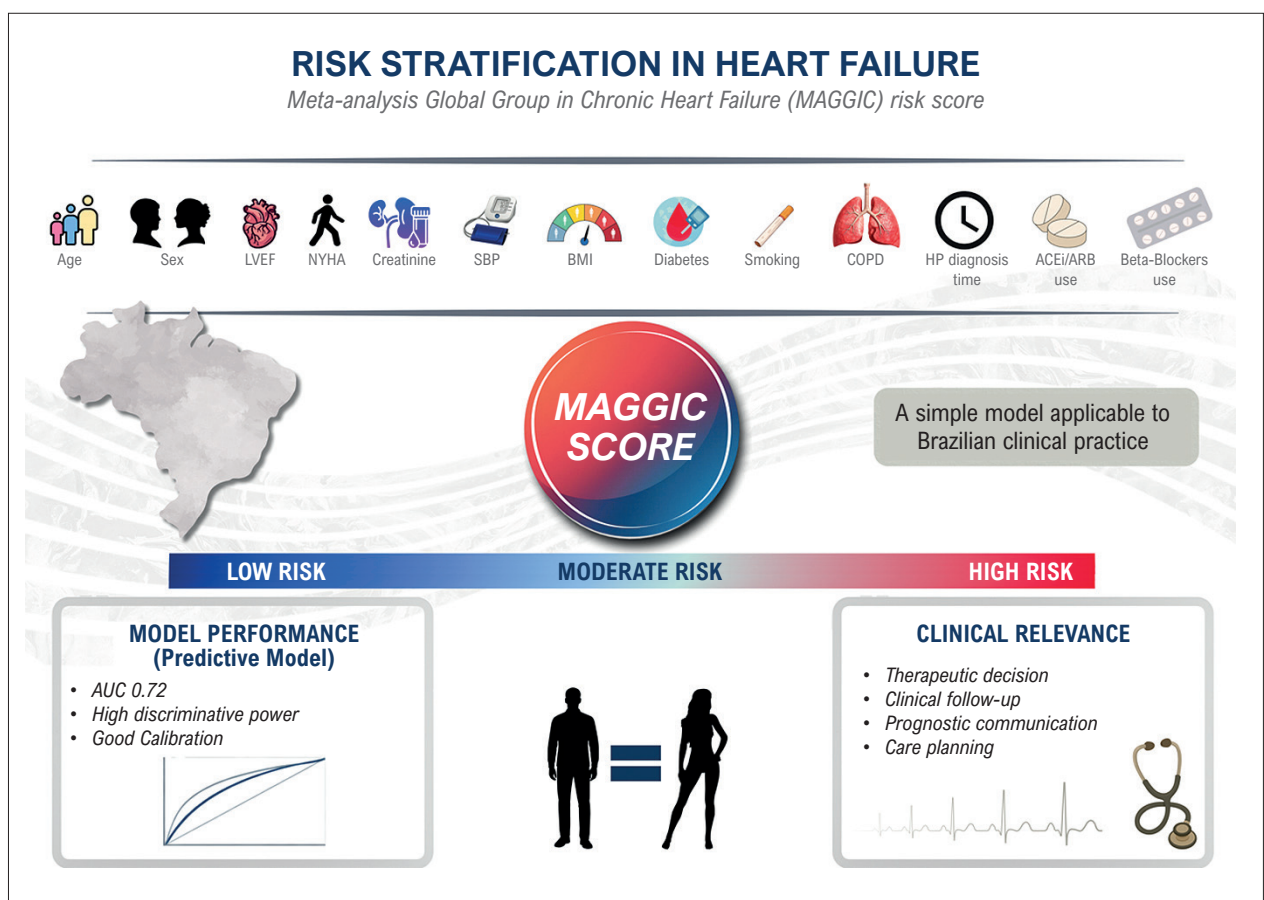


Figure 1 – Validation of heart failure risk stratification in Brazilians using the MAGGIC score.

the score's original development occurred before the widespread incorporation of contemporary prognosis-modifying therapies, such as sodium-glucose cotransporter type 2 inhibitors and sacubitril valsartan, which have been shown to reduce mortality and hospitalizations in patients with HF.¹³ The incorporation of these therapies may alter the risk profile of contemporary populations, reinforcing the need to reassess the performance of prognostic models periodically.

In summary, the validation of the MAGGIC score in a Brazilian population reinforces its usefulness as a risk stratification tool in clinical practice. The model's consistent performance and the absence of relevant differences between men and women support its applicability in the national population. As new prognosis-modifying therapies continue to transform the treatment of HF, the integration of simple, validated prognostic models tailored to different population realities will remain essential for supporting clinical decisions and optimizing patient care.

References

1. Fernandes ADF, Fernandes GC, Mazza MR, Knijnik LM, Fernandes GS, Vilela AT, et al. A 10-Year Trend Analysis of Heart Failure in the Less Developed Brazil. *Arq Bras Cardiol.* 2020;114(2):222-31. doi: 10.36660/abc.20180321.
2. Shahim B, Kapelios CJ, Savarese G, Lund LH. Global Public Health Burden of Heart Failure: An Updated Review. *Card Fail Rev.* 2023;9:e11. doi: 10.15420/cfr.2023.05.
3. Levy WC, Mozaffarian D, Linker DT, Sutradhar SC, Anker SD, Cropp AB, et al. The Seattle Heart Failure Model: Prediction of Survival in Heart Failure. *Circulation.* 2006;113(11):1424-33. doi: 10.1161/CIRCULATIONAHA.105.584102.
4. Simpson J, Jhund PS, Lund LH, Padmanabhan S, Claggett BL, Shen L, et al. Prognostic Models Derived in PARADIGM-HF and Validated in
5. ATMOSPHERE and the Swedish Heart Failure Registry to Predict Mortality and Morbidity in Chronic Heart Failure. *JAMA Cardiol.* 2020;5(4):432-41. doi: 10.1001/jamacardio.2019.5850.
6. Pocock SJ, Ariti CA, McMurray JJ, Maggioni A, Køber L, Squire IB, et al. Predicting Survival in Heart Failure: A Risk Score Based on 39 372 Patients from 30 Studies. *Eur Heart J.* 2013;34(19):1404-13. doi: 10.1093/eurheartj/ehs337.
7. Canepa M, Fonseca C, Chioncel O, Laroche C, Crespo-Leiro MG, Coats AJS, et al. Performance of Prognostic Risk Scores in Chronic Heart Failure Patients Enrolled in the European Society of Cardiology Heart Failure Long-Term Registry. *JACC Heart Fail.* 2018;6(6):452-62. doi: 10.1016/j.jchf.2018.02.001.

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7. Allen LA, Matlock DD, Shetterly SM, Xu S, Levy WC, Portalupi LB, et al. Use of Risk Models to Predict Death in the Next Year among Individual Ambulatory Patients with Heart Failure. *JAMA Cardiol.* 2017;2(4):435-41. doi: 10.1001/jamacardio.2016.5036.
8. Paula GG, Garbin HI, Kaminski ME, Mendonça DD, Souza GC, Rohde LE, et al. Performance of the MAGGIC Score in Individuals with Heart Failure: Validation in a Brazilian Population *Arq Bras Cardiol.* 2026; 123(3):e20250614. DOI: <https://doi.org/10.36660/abc.20250614i>.
9. Lam CSP, Arnott C, Beale AL, Chandramouli C, Hilfiker-Kleiner D, Kaye DM, et al. Sex Differences in Heart Failure. *Eur Heart J.* 2019;40(47):3859-68c. doi: 10.1093/eurheartj/ehz835.
0. Blumer V, Greene SJ, Wu A, Butler J, Ezekowitz JA, Lindenfeld J, et al. Sex Differences in Clinical Course and Patient-Reported Outcomes among Patients Hospitalized for Heart Failure. *JACC Heart Fail.* 2021;9(5):336-45. doi: 10.1016/j.jchf.2020.12.011.
11. Vishram-Nielsen JKK, Foroutan F, Ross HJ, Gustafsson F, Alba AC. Performance of Prognostic Risk Scores in Heart Failure Patients: Do Sex Differences Exist? *Can J Cardiol.* 2020;36(1):45-53. doi: 10.1016/j.cjca.2019.08.021.
12. McDowell K, Kondo T, Talebi A, Teh K, Bachus E, de Boer RA, et al. Prognostic Models for Mortality and Morbidity in Heart Failure with Preserved Ejection Fraction. *JAMA Cardiol.* 2024;9(5):457-65. doi: 10.1001/jamacardio.2024.0284.
13. McMurray JJV, Solomon SD, Inzucchi SE, Køber L, Kosiborod MN, Martinez FA, et al. Dapagliflozin in Patients with Heart Failure and Reduced Ejection Fraction. *N Engl J Med.* 2019;381(21):1995-2008. doi: 10.1056/NEJMoa1911303.



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