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EDITORIAL COMMENT

Contribution of a cost-effectiveness analysis in defining an adequate diagnostic strategy in patients with symptoms of obstructive coronary artery disease

Contributo da análise de custo-efetividade na definição de uma estratégia diagnóstica adequada para indivíduos com sintomas de doença arterial coronária obstrutiva

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Effective diagnosis and management of obstructive coronary artery disease (CAD) in patients with suggestive symptoms requires accurate estimation of the pre-test probability (PTP). This helps guide the decision-making process for further diagnostic testing and subsequent work-up, including the choice of tests and interpretation of results.[1] Traditionally, PTP tables based on sex, age, and type of symptoms have been used. The latest update of the PTP table, based on the European and American patient cohorts, was published by Juarez-Orozco et al. and adopted by the European Society of Cardiology guidelines in 2019.[2]

There are substantial differences between different guideline-recommended PTP models for the detection of obstructive CAD. However, the high incidence and prevalence of CAD worldwide, the availability of numerous diagnostic tests with varying accuracy, and associated costs, need a clear and evidence-based clinical strategy. Such a strategy helps avoid overuse, misuse, and unwarranted variation in practices and outcomes, which compromise the quality of care and contribute to avoidable patient harm, increased healthcare costs, and reduced patient satisfaction.[1]

Overuse and misuse in healthcare practice can lead to unnecessary procedures, tests, and treatments that increase the risk of adverse events, morbidity, and mortality. This also results in higher healthcare costs for patients, payers, and healthcare systems. Moreover, overuse and misuse can divert resources from evidence-based practices, increasing the likelihood of errors and incidents, and reducing the quality of care. Patients may consequently experience dissatisfaction, feeling that they are not receiving the necessary care, or are receiving unnecessary care that can cause harm.[3,4] Addressing these issues is paramount to improving the quality, safety, and efficiency of healthcare.

Economic evaluation is a crucial aspect of healthcare decision making that provides evidence on the costs and benefits of alternative healthcare interventions. It is a tool that enables us to identify interventions with the best value

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for money, which is helpful to inform policy makers about the most efficient use of resources.[5] There are several economic evaluation methods, each with their own strengths and limitations. The most used types of economic evaluation are cost-effectiveness analysis (CEA), cost-utility analysis (CUA), and cost-benefit analysis (CBA). CEA measures the cost per unit of health effect, measured in natural units (such as cases detected, cases averted, events, life-years saved, etc.), CUA measures the cost per quality-adjusted life-year (QALY) gained, while CBA measures costs and benefits in monetary terms.[5]

Economic evaluation methods are increasingly being applied to cardiology to inform healthcare decision making and guide resource allocation in the field. The use of economic evaluation in cardiology can help to identify the interventions that allow to maximize the health gains in a context of limited healthcare resources. One example of an economic evaluation in cardiology is the cost-utility analysis of transcatheter aortic valve implantation (TAVI) in comparison with different treatment standards for the treatment of severe aortic stenosis patients from different surgical risk groups. This analysis, developed in Italy, compared the costs and health outcomes of TAVI with several alternatives: SAVR for intermediate- and high-risk patients and medical treatment for inoperable patients. The results showed that TAVI was likely to be cost-effective in comparison with the treatment standards considered.[6] Another example was the study from de Mello Sampayo et al. (2021).[7] The authors compared the cost-effectiveness of two cardioprotective strategies for patients at risk of chemotherapy-related cardiotoxicity: universal cardio-protection for all patients, and cardio-protection initiated on diagnosis of left ventricular ejection fraction (LVEF)-defined cardiotoxicity. The authors found that an LVEF-guided strategy was a dominant compared with universal cardio-protection, i.e., provided additional quality of life at a lower cost.

Thus, the evidence generated from economic evaluation can also inform the development of clinical practice guidelines, by evaluating the strategies that are likely to be the most cost-effective. In this way, economic evaluation can help to ensure that clinical practice guidelines are evidence-based, and that they reflect the most efficient and effective use of healthcare resources. This can ultimately lead to improved patient outcomes, more efficient use of healthcare resources, and a more sustainable healthcare system.

The current edition of this journal presents a very interesting paper that addresses an important issue – the contribution of cost-effectiveness analysis in defining a robust diagnostic strategy for patients with symptoms of obstructive CAD to help guide the decision-making process for further diagnostic tests. The authors state an ambitious aim to assess the cost-effectiveness of three different testing strategies in the approach to symptomatic patients with low PTP of obstructive CAD.[8] The different alternatives included (i) defer testing, (ii) perform coronary artery calcium score (CACS), prevent further testing when CACS is zero, and perform CT angiography (CCTA) if CACS were higher than zero, and (iii) perform CCTA on all patients.

This study has some limitations, such as the narrow view from a society perspective. The authors defined the society perspective as the inclusion of costs, regardless of who pays for the treatment (i.e. cost-sharing). However, the society perspective should also consider indirect costs, such as time missed from work due to illness. Another limitation is that the study is non-representative of the Portuguese population. The study assessed cost-effectiveness using data from 1385 patients from two hospital centers with non-acute chest pain. Finally, the cost-effectiveness result was measured in incremental cost per correct diagnosis. This is a measure of the additional cost required to correctly diagnose one additional case of obstructive coronary heart disease. This is useful for ranking diagnostic strategies, but it does not provide a complete picture of cost-effectiveness for the diagnostic test. Additional measures, such as the cost per QALY, would be important to fully interpret the cost-effectiveness of a diagnostic strategy.

Despite its limitations, this research contributes to the existing literature. It is the first study conducted in Portugal to assess the cost-effectiveness of CACS as a gatekeeper for further testing in patients with a low PTP of obstructive CAD. The results showed that for a cost-effectiveness threshold between €1366 and €2172 per correct diagnosis, testing is generally recommended even for patients with a low probability of having obstructive CAD. The authors suggest that the decision to adopt this strategy depends on the affordability and willingness to accept missed diagnoses.

Additionally, the subpopulation analysis was quite interesting. Gomes et al. (2023) found lower prevalence of obstructive CAD among women. However, among those with a calcium score of zero (indicating no calcium build-up in the arteries), women were approximately twice as likely to have obstructive CAD compared to men. This might explain the lower incremental cost-effectiveness ratio for the CCTA alternative. Previous studies found that women experience longer delays in receiving a diagnosis and treatment for CAD, and this finding suggests that those delays may be worrisome among women with no evidence of calcium build-up in their arteries. One possible explanation for the delays in diagnosis and treatment among women is that they tend to present atypical symptoms, which can make it more difficult for healthcare providers to recognize the underlying problem. Additionally, women may interpret their symptoms differently from men, and may be less likely to seek medical attention.[9]

Overall, these findings highlight the importance of recognizing the unique risk factors and symptoms of CAD in women, while ensuring that the healthcare system is designed to recognize and address these differences. Thus, assuring timely and effective treatment.

The main results of this study provide important information for decision makers and stakeholders, such as healthcare providers, patients, the community, and policy-makers in choosing the most cost-effective testing strategy.

Conflicts of interest

The authors have no conflicts of interest to declare.

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