Early-stage Health Technology Assessment of Fractional Flow Reserve Computed Tomography versus Standard Diagnostics in Patients with Stable Chest Pain in The Netherlands

Boot, I.W.A.[1]; Soeteman, D.[1]; Vrijhoef, H.J.M.[1]

[1] Panaxea b.v., Amsterdam, North Holland, The Netherlands; ✉ iris.boot@panaxea.eu

Introduction

The introduction of fractional flow reserve derived from coronary computed tomography angiography (FFR-CT) could provide a non-invasive alternative to current diagnostics in patients with stable chest pain in The Netherlands (Figure 1).[1-3] The aim of this study was to assess the healthcare costs and effects of FFR-CT guided diagnostics compared to standard diagnostics.

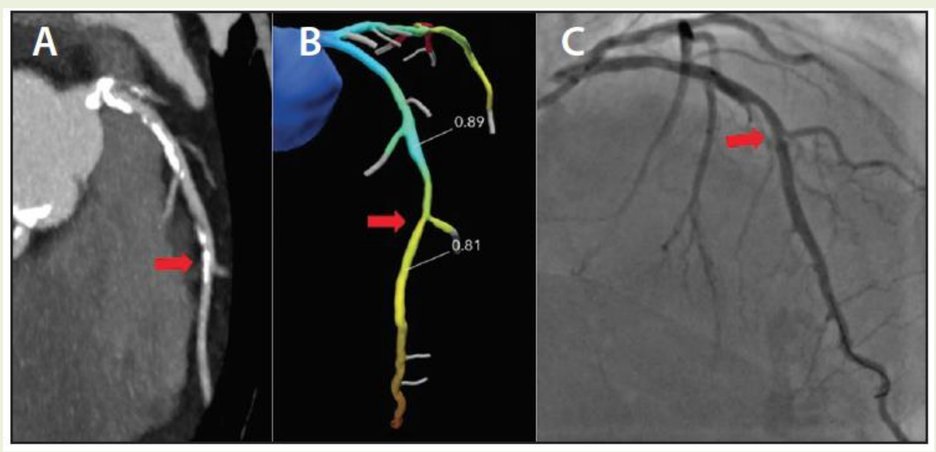

Figure 1: *Non invasive FFR-CT of an intermediate lesion in a symptomatic patient with multivessel disease. Panel A shows CCTA (50-70% stenosis), panel B shows FFR-CT (0.81 beyond the lesion), and panel C shows invasive angiography (FFR value of 0.85), supporting the decision-making from FFR-CT[4].*

Methods

A decision-tree model was developed to assess the difference in costs from the hospital perspective, probability of correct diagnoses, and risk of major adverse cardiac events (MACE) after one year. The costs included were clinician time, disposables, equipment, medications, and treatments. Total costs for 2022 were calculated using a micro-costing approach. One-way sensitivity analyses were conducted to determine the main drivers of the cost difference between the strategies. To determine the added price of FFR-CT analysis (computational analysis only, excluding coronary computed tomography angiography (CCTA)) at which point both strategies are equal in costs, a threshold analysis was conducted.

Results

The mean one-year costs were €2,867 per patient for FFR-CT and €2,960 per patient for standard diagnostics. The one-year probability of correct diagnoses was 0.80 and 0.67, respectively. The one-year risk of MACE was 0.0006 for FFR-CT and 0.01 for standard diagnostics (Table 1). One-way sensitivity analyses showed that the main drivers of the difference in costs between the strategies were the probabilities and costs of revascularization, and test characteristics of FFR-CT and CCTA (Figure 2). The threshold analysis indicated that the added price of FFR-CT analysis should be below €793 per patient to be considered the least costly option.

	FFR-CT	Standard diagnostics
Costs (€)	2,867	2,960
Correct diagnoses	0.82	0.71
MACE	0.0006	0.01

Table 1: *Mean one-year costs per patient, correct diagnoses and risk of MACE for FFR-CT and standard diagnostics*

Conclusion

These early HTA findings suggest that FFR-CT may reduce total healthcare spending, probability of incorrect diagnoses, and MACE compared to current diagnostics for patients with stable chest pain in the Dutch healthcare setting. Future cost-effectiveness studies could determine a value-based pricing for FFR-CT and quantify the economic value of the anticipated therapeutic impact.

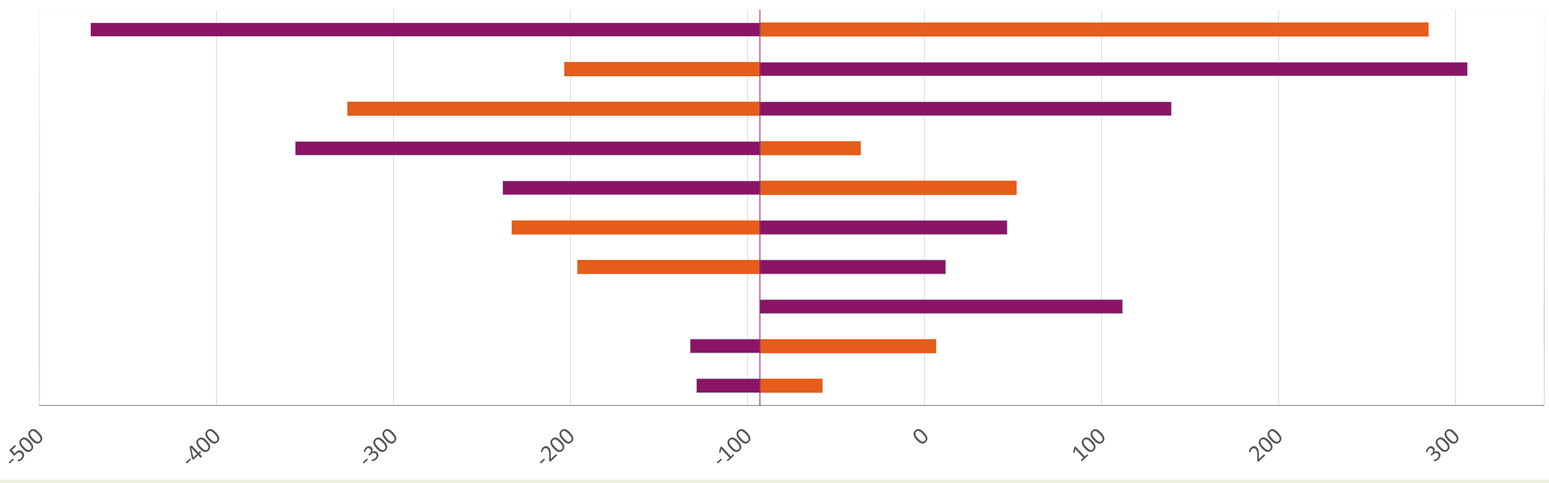

Figure 2: *Model input parameters that have the greatest impact on the difference in costs between FFR-CT and standard. Vertical axis indicates the variables with the upper and lower values of the range used. The horizontal axis indicates the incremental (or difference in) cost between the two strategies.*

References

1: Douglas PS, De Bruyne B, Pontone G, Patel MR, Norgaard BL, Byrne RA, Curzen N, Purcell I, Gutberlet M, Rioufol G, Hink U, Schuchlenz HW, Feuchtner G, Gilard M, Andreini D, Jensen JM, Hadamitzky M, Chiswell K, Cyr D, Wilk A, Wang F, Rogers C, Hlatky MA; PLATFORM Investigators. 1-Year outcomes of FFRCT-guided care in patients with suspected coronary disease: The PLATFORM Study. J Am Coll Cardiol. 2016 Aug 2;68(5):435-445.

2: Danad I, Szymonifka J, Twisk JWR, Norgaard BL, Zarins CK, Knaapen P, Min JK. Diagnostic performance of cardiac imaging methods to diagnose ischaemia-causing coronary artery disease when directly compared with fractional flow reserve as a reference standard: a meta-analysis. Eur Heart J, 2017. 38(13): p. 991-998.

3: Driessen RS, Danad I, Stuijfzand WJ, Raijmakers PG, Schumacher SP, van Diemen PA, Leipsic JA, Knuuti J, Underwood SR, van den Ven PM, van Rossum AC, Taylor CA, Knaapen P. Comparison of Coronary Computed Tomography Angiography, Fractional Flow Reserve, and Perfusion Imaging for Ischemia Diagnosis. J Am Coll Cardiol, 2019. 73(2): p. 161-173.

4: Khalique, O. (2019). *FFRCT: Why Should Interventional Cardiologists Care?* Retrieved July 2022 from https://citoday.com/articles/2019-may-june/ffrct-why-should-interventional-cardiologists-care.

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